The Chemical Age

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Contents

	PAGE
Editorial Notes: Reparation by a short Cut; A Dyestuffs Development Committee; Twentieth Century Discovery; List of Prohibited Dyestuffs	323
The Calendar	325
Recent Progress in Rubber Chemistry and Technology—(III.) By Dr. PHILIP SCHIDROWITZ	326
British Chemical Trade with Canada. By J. WADDELL	328
Lubricators and Lubrication	329
Patent Law and Chemical Research	330
Alcohol from Coke Oven Gas	331
A Ministry of Origins. By ERNEST J. P. BENN	332
British Chemical Industry	333
A Fertiliser Combine	335
Oil and Colour Chemists	336
Society of Chemical Industry: London and Edinburgh Sections	337
Chemical Matters in Parliament	338
From Week to Week	339
References to Current Literature	340
Patent Literature	341
Market Report and Current Prices	344
Company News: Chemical Trade Inquiries	346
Commercial Intelligence	347
New Companies Registered	348

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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The Easter Holidays

The Offices of this Journal will be closed from the evening of Thursday, the 24th March, to the Morning of Tuesday, the 29th March.

Our Spring Number

NEXT week we shall publish our first Special Spring Number. It promises at present to be the largest issue of THE CHEMICAL AGE yet produced, and the contents, we hope, will not be unworthy of its dimensions. Next week being Easter week, the paper will go to press on Wednesday evening instead of Thursday evening, and contributions for this special issue must reach us not later than Wednesday morning.

Reparation by a Short Cut

MR. LLOYD GEORGE is brilliant at short cuts, and when he suggested that we should penalise the German defaulters by retaining half the amount of every account paid to them, everybody exclaimed, "Splendid!" So, no doubt, it would be if the execution of the idea were as simple as its suggestion. We should just tax the German at the source as the income-tax collector does with our own dividends. But when the German Reparation Bill was issued, the briefest glance was sufficient to show the endless complications to which this direct action threatens to lead. Instead of being a simple and direct process it turns out to be confused and tortuous. To secure one interest it upsets a dozen. The net effect upon the trading community is one of confusion, if not of despair. This feeling has been fully reflected in the debates on the Bill. Everywhere the attitude is uncertain and critical. Though the Bill will, no doubt, go through, with an automatic majority behind it, and though the main purpose it has in view is generally approved, its operation is viewed with grave misgiving on every side.

In the chemical and dyestuffs trade there is but one opinion among the merchant class. The Germans, they say—and German commercial habits are known in the trade pretty well—will not do business on the terms of the Reparation Bill. Either they will refuse to ship goods unless prepayment is made in full, or, as some suggest, they may increase their prices 100 per cent. It may be retorted that if they decline business on our terms they will lose trade, because they cannot make up for the loss of British trade by a corresponding gain in other markets. That may be true, but the vital point is that we shall lose also—lose the benefit of trade, which means, of course, exchange of commodities, between this country and Germany, and lose that alluring capture of the promised 50 per cent. The general feeling is that the position created will be so hopeless that the system will simply peter out. The only possible advantage is that in a case here and there, owing to certain German chemicals not coming in, the manufacturer or merchant for a time may be able to put up his prices a few points. But the advantage is too small and isolated to be put against the general dislocation of industry.

Meanwhile, traders who have entered into commitments do not know where they stand and cannot find out. There is no definite statement in the Bill as to when the provisions are to come into force, but apparently March 8 will mark the dividing line. Clause IV. provides that where a person, under a contract entered into before that date, is liable to accept bills of exchange, or make advances in connexion with the importation of goods, he may apply to the High Court for relief from any hardship he may suffer. This light-hearted remedy will be gratefully welcomed by the lawyers, to whom it promises additional practice, but the condition of trade leaves the trader at present little margin of time or money for these legal luxuries.

The present position is that numbers of traders have contracted with German firms to purchase goods, which have been re-sold in advance to customers in this country who are demanding delivery. Before

shipping the goods or surrendering documents, however, the German firms demand prepayment in full. Consequently the British trader cannot supply his customers because he cannot get the goods; he cannot get the goods because he dare not pay the German makers in full; the goods, therefore, lie idle at Rotterdam or Hamburg or somewhere in Scandinavia, and the British merchant and his customers stand idle here. The position is simply a muddle.

The Bill is equally disturbing in its direct effects on trade, and in its indirect implications. The latter are vigorously discussed from a new angle on another page by Mr. E. J. P. Benn, who sees in the measure an extension of the pernicious practice of official intervention in trade and commerce. It is, perhaps, going too far to say that the present Bill is simply a Bill to provide work for officials, but the fact that its administration will undoubtedly call for the aid of battalions of officials and lawyers substantially adds to its terrors for the trader community.

[Since the above was written we notice that an amendment by Mr. Chamberlain has been agreed to, fixing the date of operation of the Bill at March 31.]

A Dyestuffs Development Committee

VERY little has been heard of the Dyestuffs Development Committee as compared with the Dyestuffs Advisory Committee, but of the two it is immensely the more important. The latter committee is merely concerned with the restrictive side of the business. It is appointed to advise the Board of Trade as to the exclusion of foreign competitive products. But restriction of competition is merely a temporary expedient, intended to hold off opponents from young British industries until the latter can meet them on equal terms. The Development Committee, on the other hand, represents the constructive side of the work. While the one gives protection from outside attacks the other develops the capacity to meet such attacks with success. It aims at the only ultimate form of protection worth having, namely, the power to maintain one's own position against the strongest opposition the world can produce.

There can therefore be no divided counsels on the subject of development, however much there may have been on that of restriction. Here all who desire to see British industries flourish can work unitedly on common ground for the national good, and the time has come to ask what is being done to start this vitally important work. Mr. Waddington put a question on the subject in the House of Commons the other day, and it met with a somewhat leisurely answer from the Minister representing the Board of Trade. That Department, we are assured, is giving the matter its best consideration. No doubt. So much may be expected of all Government departments. What is wanted now or very soon is practical action. If Mr. Waddington and his friends should become even more persistent in pursuing their inquiries we shall not be severe on them.

When it comes to action, the course is clearly marked out in the Dyestuffs Act itself. There it is laid down that for the purpose of advising them with respect to the efficient and economical development of the dye-making industry the Board of Trade shall constitute a committee of persons concerned in the trades of dye-maker or dye-user and of such other persons not directly concerned in such trades as the Board may determine. For the moment the question which party should be in the majority need not be decided. It is, after all, a detail. The essential objects aimed at are three—development, efficiency and economy. The provision for development is in itself a confession of our imperfect condition at present. The whole business of dyestuffs manufacture needs to be expanded until at least it is equal to our own needs and leaves something over for export. "Efficient" development we take to mean such improvements in processes and results as will enable the industry to live on its own merits. Inefficiency may be made up for by artificial aids for a time; in the end it means certain extinction. By "economical" development is meant presumably the best use of plant, raw materials and organisation so as to secure the highest return from the lowest expenditure of money and effort.

We have here a really big programme to which the most constructive minds in the industry may profitably give their attention. To attain success there must be complete co-operation among all concerned, and readiness to modify, adapt, or extend existing works so as completely to correlate all the individual plants and make each contribute its due proportion to the final result desired. In one case, where the output is excessive, there may be need of retrenchment; in another, where it is deficient, there may be need of expansion. The committee can only do its work effectually when it is clothed with powers corresponding to those of a directorate, and all the departments under it recognise the need of central control and direction. Fortunately, this is much more easily possible to-day than a few years back. Manufacturers have learnt the value of pooling their experience and their resources, instead of each working on individual lines. Merchants are gradually coming to see the necessity of co-operative action in their collective interest. Individual concerns are gradually being educated out of the old exclusive attitude into a collective and co-operative relation. If the Development Committee can unite all the units in the industry on this broad basis, if all preferences and jealousies between large and small concerns are submerged, if fair and equal opportunities are given to all who have anything to contribute, and if all concerned are prepared to give and take for the common benefit, we may yet have a dyestuffs and organic chemical industry really worthy of the nation.

Twentieth Century Discovery

IF one was asked to enumerate the ten most important discoveries or advances in science which have occurred during the past twenty years a good deal of reflection would probably be necessary before an answer could be provided. Opinions as to the utility of any particular discovery must, of course, be decidedly variable, but an American writer—Mr. R. A. Millakan—has aptly summarized the matter in a manner with which most will agree. Although in these times of stress we are

mainly concerned with the present it is just as well for us to be reminded at times that processes which we are probably turning to profitable account at the moment have been rendered possible by the modification of principles enunciated by some pioneer worker in the past two decades. Mr. Millaken is primarily a physicist, and his selection has no doubt been influenced by this fact. Accordingly, first in his list he places the verification of the adumbrations of the Greeks regarding the atomic and kinetic theories —the proof, in fact, that this world does consist, in every part of it, of matter which is in violent motion. This advance, moreover, was made, not by a practical man but by a mathematician, namely Einstein, who never did any practical work in his life. We do not pretend to be able to explain the Einstein theory in a few lines, but the results consist in predicting how far a given particle which can be seen in an ultra-microscope will drift in a given time. Or, more simply still (as someone has said), Newton stated that an apple fell from a tree in a direct vertical line ; but, according to Einstein, it waltzes round.

The second advance is the proof of the divisibility of the atom, a proof which grew out of the discovery of X-rays. The third is the discovery of radio-activity, and here we found matter doing undreamed-of things, namely, shooting off from itself both negatively and positively charged particles, the negatives with a speed approaching 186,000 miles per second. Mr. Millakan puts fourth in order the discovery of the atomicity of electricity the proof that what we call electricity is built up of a definite number of "specks" all exactly similar, so that an electrical current consists merely in the journey along a conductor of these definite material bodies. Fifthly, and again a physical consideration, is the forwarding of evidence of the electrical origin of mass. In other words, there is no inertia in matter which is not electrical in its origin ; and, to consider the negative electron, this is nothing but a disembodied electrical charge, and its inertia is wholly of an electrical origin. We next come to the discovery of the nucleus atom, that is to say we know that the atom is somewhat like a miniature solar system, with an extraordinary minute nucleus and a certain number of subsidiary planets (negative electrons) around the outside. A further discovery told us exactly how many electrons there are in the nucleus. Again, we come to the research in the field of X-rays and the work carried out by Barkla in 1904. This investigator and others proved that there are two types of X-rays, namely, those which consist of simple ether pulses pushed off from an electron when it changes speed, and the so-called characteristic rays which are formed, so to speak, when the electrons bump into a target and set something in the target in vibration, resulting in the emission of definite rays which are like monochromatic light.

The eighth discovery to mention is in connection with crystal structure, largely due to Professor Bragg, and there appear to be almost unlimited possibilities for the chemist in the determination of the exact positions of the atoms in any kind of crystal. More important still, no doubt, is discovery of the relations between the elements, and the extension of our knowledge of the radiations emitted by different substances. This discovery was made by Moseley at the age of 26, and he was unfortunately killed a year later. Lastly, Mr. Millakan includes the discovery of the quantum relations in optical spectra. From the point of view of the physicist his selection is certainly complete ; but there are, of course, many discoveries in applied chemistry which are entitled to rank equally with those mentioned above.

List of Prohibited Dyestuffs

THE list of dyestuffs, the importation of which is prohibited under the Dyestuffs (Import Regulation) Act, has now been completed by the Board of Trade, and is available for use by the trade. It takes the form of a pamphlet of 19 pages, and includes the principal classes of synthetic dyestuffs and a list of products, other than finished synthetic dyestuffs, which come within the scope of the Act. The list, it is stated, is published for the information and guidance of importers, but it is intimated that it does not purport to be exhaustive, and additions may require to be made to it from time to time. The mere fact, therefore, that a particular product does not appear by name in the list is not to be regarded as conclusive evidence that it is not covered by the prohibition. In cases of doubt special reference is advised, either to the Dyestuffs Committee, Manchester, or to the Board of Trade (Industries and Manufacturers Department), Great George Street, S.W.1. The list of products includes :—

Synthetic organic products in any form, as for example direct cotton colours, union colours, acid wool colours, chrome or mordant colours, basic colours, sulphide colours, vat colours, lake colours, colours soluble in oil, spirit, or wax, alizarine, synthetic indigo, and all other synthetic organic dyestuffs ;

Synthetic organic colours and colouring matters in any form whatever, including any colours or pigments containing a percentage of any synthetic organic dyestuffs ;

Leuco compounds or leuco bases ;

Organic intermediate products, of which a detailed list is given.

The Calendar

Mar. 19	North of England Institute of Mining and Mechanical Engineers : General Meeting : Papers by J. Eltringham ; J. Southern. 2 p.m.	Wood Memorial Hall, Newcastle-on-Tyne.
21	Chemical Industry Club : Address by Dr. W. R. Ormandy, on "Electric Shadows and Wireless Telegraphy."	2, Whitehall Court, London.
21	Royal Society of Arts : "X-Rays and Their Industrial Applications," by Major G. W. C. Kaye. 8 p.m.	John Street, Adelphi, London.
22	Faraday Society : Papers by Professor A. W. Porter ; W. E. Hughes ; S. Field ; Professor A. Findlay and V. H. Williams. 8 p.m.	Burlington House, Piccadilly, London.
22	Institute of Metals : "Gun Metal," by R. T. Rolfe. 7.30 p.m.	Imperial Hotel, Birmingham.
22	The Sheffield Association of Metallurgists and Metallurgical Chemists : "Carbides," by F. C. Thompson.	Sheffield.

Recent Progress in Rubber Chemistry and Technology—(III)

By Dr. Philip Schidrowitz

The Rubber Manufacturing Industry

Compared with industries such as the textile, steel or heavy chemical, the rubber industry is a comparatively modern one; indeed, it is scarcely going too far to say that it has only developed into a branch of manufacture of first class magnitude within the last decade. That being so, it is not astonishing that the plant and methods employed are in many respects of a somewhat elementary or transitional character. They are still largely the methods of a craft rather than those of applied science. It must be remembered, however, that the difficulties which, owing to the peculiar nature of the material, the engineer or chemist is constantly meeting in the rubber industry, have no parallel in any other branch of manufacture, and that the experience gained in the older industries is not easily or directly applicable.

Mixing Operations

Nevertheless, signs are not lacking that empirical methods are gradually passing away, and it may be anticipated that the coming decade will see the rubber industry established on a thoroughly scientific basis. While the bulk of the mixings are still made on "open" horizontal rolls, the introduction of enclosed mechanical mixers operating by means of masticating blades is undoubtedly a step in the right direction. Such machines are labour saving, reduce the dangers attendant on the old system to a minimum, and ensure methodical and consistent working. Moreover, the difficulties encountered in large scale working of the modern tough and "dry" mixes, suitable for instance, for tyre treads, and in incorporating extremely fine powders and volatile materials of an (from the point of view of health and cleanliness) objectionable character, are overcome. Mechanical mixers, too, readily lend themselves to *power control*, and as Grundy and the writer have shown,* the plasticity of a mixing can be sharply gauged by determining (by means of a delicate electricity meter) the current used over a short time interval. Some method of the kind is, indeed, desirable, for the only fundamental point in favour of the ordinary rolls is that the operative's sense of touch is available for judging the condition of the mix.

Control of Temperature

Control of power, however, is not sufficient; an accurate control of temperature is also necessary, for while the same degree of plasticity may be obtained by using say x units of power and y units of heat, as by a units of power and b units of heat, the result, so far as the quality of the vulcanised goods is concerned, will not necessarily be the same. Improvements in this regard may be looked for in the direction of a single temperature, fluid circulation system of considerable head and speed.

Making Up and Calendering

The design of calenders has much improved in many details, but the methods whereby, for instance, a solid tyre is built up by running a band of material directly from a calender on to a drum or mandrel—in substitution for the old laborious process of hand ply work—is worthy of special mention. Formerly "solids" were either built up by hand or "forced," but so far as the writer's experience goes the latter process has largely fallen into disuse, better results being attained (whether by hand or mechanically) by the multiple ply method.

* Brit. Patent No. 15,438 of 1915.

Vulcanisation

Plant.—In view of the fact that quite two-thirds of the rubber marketed is employed in the tyre industry, it is not remarkable that considerable improvement has been effected in the special vulcanising plant required by the latter. The autoclave or pan press, which, substantially, is a press surrounded by an autoclave jacket, of great depth so as to take a large number of moulds, is almost universally employed, excepting of course for wrapped goods (two-process pneumatic and some solids). Such presses are built up to a great size and on very powerful lines in view of the great pressures necessary to ensure the tight closing of a nest of many super-imposed, heavy moulds with their contents of an expanding, semi-fluid mass. Quick-working designs of the self-closing or boltless head type are now largely used in place of the old patterns, closed by means of swing bolts or similar devices.

Control of Temperature

When we realise that a "cure" may be anything from a few minutes at 100 lbs. (steam pressure) up to 10 or 12 hours at 30 lbs. to 60 lbs., it is evident that accurate control of temperature is of prime importance. While automatic control appliances are occasionally used, it must be admitted that in many works temperature control is distinctly faulty, and reliance is placed, as often as not, on the observation of a single pressure gauge by an unskilled labourer. It is probable that more trouble has arisen in rubber works from faulty temperature control (owing to defective gauges or thermometers, or the placing of these instruments in wrong positions, or to lack of skill or carelessness on the part of the worker, or, finally, to the insidious dangers of the steam trap) than from any other cause. Recording or "tell-tale" appliances are frequently employed, but while the use of control appliances of this nature is eminently desirable, probably the most effective way to avoid trouble is the use of an appropriate reducing valve either on or quite close to the vulcanizer, coupled with a large margin of steam pressure on the far side of the valve, and an open exhaust at the steam exit.

Accelerators

The introduction of organic catalysts or "accelerators" is one of the most striking developments in connexion with the factory vulcanisation process during recent times. Mineral accelerators, consisting of oxides of a basic character (litharge, magnesia and lime), have been used for many years past, and—particularly in the case of litharge—are not likely to be entirely displaced by organic catalysts, but, speaking broadly, it would appear that their action and scope is of a different order or character than that of the latter. Thus, comparing, for instance, magnesia with an organic accelerator, Kratz and Flower* have recently shown that while the activity of the former is dependent on the nature or quantity (or both) of certain "secondary" components of crude rubber (*e.g.*, the resin), the action of the latter is independent of such substances and appears to bring about a direct aggregation or polymerisation of the rubber molecule. This action, however, is dependent, it need scarcely be said, upon the presence of sulphur,

* *J. Indust. & Engin. Chem.*, October 1920.

either as such, or in temporary or transitional combination with the accelerator. Most organic accelerators are either strong bases as, for instance, di-ethyl-amine, aniline, piperidine, or guanidine, or compounds resulting from the interaction of bases with active substances such as nitrous acid, formaldehyde or carbon bisulphide, for instance, nitroso-di-methyl-aniline,* thio-carbanilide, piperidyl-di-thio-carbonate of piperidine, anhydro-form-anilide, furfuramide, hexamethylene-tetramine, aldehyde-ammonia, the CS_2 compound of di-ethyl-amine, &c.

Bayer & Co.† claimed the use of all basic ammonia derivatives and all nitrogenous organic bases possessing a dissociation constant greater than 10^{-8}. Some of these substances are of extraordinary activity, for instance, Cranor‡ has shown that 0·25 per cent. of the CS_2 compound of di-ethyl-amine will reduce the curing time of a specified mixing from several hours to a few minutes, and that such a mixing will, in the course of a few weeks, vulcanize if stored in a moderately warm room. Similarly, using a very small quantity of an accelerator of this type, the writer has found that a mixing curing normally at a "rise" of 17 minutes to 141°C. plus 3 hours at this temperature, is grossly over-cured at the end of the "rise" alone.

Another class of catalysts is that consisting of compounds derived from the solution or interaction of the alkalis, or alkali-metals, in or with alchohols or phenols,§ oleic acid, &c., such as a solution of caustic soda in a fatty alcohol, or sodium ethylate or phenate and sodium or lead oleate. These appear to derive their activity from the alkali radicle,‖ for it was previously known that caustic soda, for instance, is a powerful accelerator. Eaton¶ converted a slow-curing crepe (vulcanising in 3 to 3½ hours) into a rapid curing rubber (¾ to 1 hour) by soaking in a 1 per cent. solution of caustic soda, but found that such treatment is not desirable, inasmuch as goods so treated rapidly became extremely "tacky" and finally almost liquid. The writer may mention that he made similar observations in connexion with certain grades of crude rubber as far back as 1910. It is interesting to note, therefore, that the introduction of caustic soda (for instance, in glycerol solution) into a mixing does not appear to exercise any detrimental effect similar to that observed on the treatment of freshly-made rubber with an aqueous solution of the alkali.** In the latter case, possibly, the injurious effect is due to the elimination of alkali soluble matter.

Properties of Accelerated Mixings

Mineral accelerators, apart from their catalytic effects, necessarily impart to the mixings properties similar to those due to inert mineral fillers. This aspect of the use of mineral catalysts is frequently accentuated by the relatively large proportions in which they may be employed. One would, for instance, look for a considerable decrease in distensibility in a mix containing 15 to 20 per cent., say, of light carbonate of magnesia; but, in the case of organic accelerators, specific effects entirely different in character may be obtained by employing the same, and that possibly with a very small proportion of the various catalysts. In some cases a marked increase in tensile strength, coupled with some decrease of distensibility, may be observed; or, again, strength and distensibility may both be improved, or the former remain more or less constant, with an increase of the latter. The main advantage—apart from any specific effect on mechanical properties—of the organic accelerator is that vulcanisation may be greatly expedited by the use of a quantity so small as not to have any material effect on the general character of the mixing. Regarding the vulcanisation process as composed of two phases, that of aggregation (as a result of the specific curing effect) and of dis-aggregation (the result of heating the uncombined rubber), it is clear that the more the former can be accentuated at the expense of the latter the better the product should be. *A priori*, also, one would expect that the "ageing" of accelerated mixings should compare favourably with that of slow curing goods; but so far very little has been published on this important subject.

Sulphur Percentage in Mixings

Subject to "ageing" qualities, substantially the same effect may be produced by (*a*) a large quantity of sulphur and a low heat, or (*b*) a small quantity of sulphur and a high curing temperature, or by varying the conditions of *time* as between (*a*) and (*b*). By the use of a catalyst, however, we can obtain the desired effect by using a minimum as regards sulphur content, temperature and time. In the presence of an *excess* of sulphur, over-curing, followed by hardening or perishing of the goods, are liable to take place; if the sulphur is present in *insufficient* quantity, or if heating is prolonged after the bulk of the sulphur has "combined," an over-heating effect (quite distinct from over-curing) may be anticipated. It seems probable, however, that, in practice, the latter is less likely to prove disastrous than the former, or that, alternatively, it can be more readily avoided.

Theory of Accelerators

Various theories as to the nature of the catalytic action of accelerators have been advanced. One view is that a reaction product between the nitrogenous accelerator and sulphur is the agent which either aids or is responsible for the satisfactory vulcanisation of the rubber with the sulphur.* According to Kratz,† and his co-workers: (*a*) The action of certain substances, such as diphenyl-thio-urea, is due to their tendency to decompose under vulcanisation conditions into simpler substances which contain an active nitrogen group, which is responsible for the acceleration effected. (*b*) Molecularly equivalent quantities of substances which contain the same active nitrogen group in their primary nucleus effect the same accelerating activity. (*c*) The replacement of the hydrogen in the active nitrogen group by other or larger groups or radicles, decreases the activity of the parent substance. (*d*) The activity of the nitrogen in certain groups is most readily interpreted as due to a change in valency from three to five, with the temporary addition of sulphur; the active nitrogen group would thus function as a sulphur carrier.

André Dubosc‡ postulates not pentavelent nitrogen, but hexavalent sulphur, as the catalytic characteristic. According to him, nitrogenous catalysts during vulcanisation induce the formation of thio-cyanic acid, $H-C\equiv S\equiv N$, which decomposes into HCN and hexavalent sulphur. The free hydrocyanic acid combines with a further molecule of divalent sulphur to form thiocyanic acid, and this cycle of changes is repeated indefinitely. Hexavalent sulphur then (on account of its great number of free valencies compared with the divalent form) is regarded as the active substance proper.

Gas Vulcanising Process

A novel method of cold curing has been evolved by Peachey.§ This consists in exposing the rubber mixing in suitable form to the action successively of SO_2 and H_2S. The mix is said to absorb the gases readily and in sufficient quantity (according to the equation $2\ H_2S+SO_2=2\ H_2O$

* Peachey, Brit. Patent, 4,263 of 1914.
† *D.R.P., 1912, No. 265,221*, and *Brit. Patent, 1914, No. 12,661.*
‡ *India Rubber World*, 1919, 61,137.
§ Dunlop Rubber Co., Ltd., and Twiss, Brit. Patent No. 125,696 (1918); North British Rubber Co. and Porritt, Brit. Patent No. 129,798 (1918).
‖ Martin, *The Rubber Industry*, 1914, 205.
¶ *Loc. cit.*
** Twiss and Dunlop Co., Brit. Patent No. 110,059 (1916).

* Brit. Patent No. 130,857 (1919).
† *India Rubber Journal*, 59-22, 1041-1047.
‡ *Le Caoutchouc et la Gutta Percha*, 1920, 17, 10511-10514.
§ Brit. Patent No. 129,826 (1918).

+3S) to bring about complete and effective vulcanisation, and in a time which compares favourably with the length of cure required (for non-accelerated mixings) by the ordinary hot process. A cold process of this kind, if commercially practicable, should undoubtedly possess considerable advantages, inasmuch as the range of fillers (to mention one of them) that could be used would be considerably extended. The undesirable heat effect also is avoided. It is as yet too early to be able to give any definite details as to commercial working or the practical scope of the new method.

British Chemical Trade with Canada

To the Editor of THE CHEMICAL AGE.

SIR.—I read with interest your Empire issue of January 29. Any evidence of increased interest on the part of Great Britain in her overseas Dominions or of the latter in the Motherland is to be welcomed.

I think most Canadians would prefer to buy from Britain rather than from any other country outside the Dominion. Some of us think that we buy far too much from the United States. One reason for that may be that United States firms advertise in our papers and periodicals. I have just been, looking through the advertisements of the February issue of *Canadian Chemistry and Metallurgy* (formerly *Canadian Chemical Journal*). In 36 pages of advertisements I find only four British ones, amounting in all to one page. Besides these there is a full-page advertisement by a Canadian firm of English silica ware. But approximately half of the 36 pages are taken up by advertisements of U.S.A. firms. Whatman's filter papers are advertised by a company in New York. Why should they not be supplied to Canada from Britain direct? There is no British advertisement to off-set Eimer and Amend, of New York, or the General Scientific Company, of Chicago, or the Thomas Company, of Philadelphia. Can Britain not supply our universities and industrial laboratories with apparatus and chemicals or is our trade of so little value that it is not worth bothering about?

Canada buys from the United States in goods of all kinds over nine million dollars worth in the year. A large portion of this doubtless could not be got from Britain; but suppose that only one quarter of it could be, the value would be very considerable. Canada is partly to blame for the large importation from the United States; perhaps Britain is also partially responsible,—I am, &c.,

Queen's University, Canada. JOHN WADDELL.
February 25, 1921.

Muriate or Sulphate of Potash

Owing to pressure on our space we are reluctantly compelled to hold over three important letters on this subject until our next issue.

Synthesis of Ammonia

ON November. 11, 1919, states the *Frankfürter Zeitung*, a contract concerning the cession of the Haber patents, for the manufacture of synthetic ammonia was concluded between the Badische Anilin und Sodafabrik and the French Ministry of Reconstruction. The French engineer, Georges Claude, had worked out a process on a similar basis for which an experimental plant had been set up at Grande Paroisse, in France. The advantage of this process is considered to be the fact that it allows without difficulty the manufacture in small quantities in any place where hydrogen is to be won as a by-product. The experimental factory mentioned above has made so much progress in the course of this year that at present 1½ tons of fluid ammonia are delivered every day as against 150 litres per day in January, 1920. For the sake of comparison it may be noted that the production at Oppau by the Haber process was, in 1913 20,000 tons; in 1914, 50,000 tons; in 1916, 300,000 tons; and in 1917 more than 500,000 tons, while at the present time 200 tons are stated to be delivered in the space of 24 hours.

Seed Oil Extraction

Practicability of the Solvent Process

A NEW process of oil extraction was discussed by Mr. R. A. Bellwood, M.I.M.E., President of the Hull Chemical and Engineering Society, and a director of Rose, Downs & Thompson, Ltd., Hull, at the Manchester College of Technology recently.

The new process consisted in heating the seed, which had previously been ground fine, to the necessary temperature and subjecting it to agitation. The simultaneous cooking and agitation drove the moisture out of the material, and converted the seed into a semi-liquid or similar condition. The hot semi-liquid material was passed to a centrifugal separator of the continuous type. This machine was kept heated to a temperature approximately that of the material as delivered from the cooking vessel. The centrifugal separator separated a large percentage of the oil from the solid contents of the material.

A convenient form of apparatus consisted of a number of steam-jacketed conveyors, placed one above the other. The paddles were revolved at a high speed, but set so as to give a very slow travel, but excessive agitation to the material under treatment. The ground material travelled along the top conveyor and fell into the one directly below, travelling first one way and then another, until it had travelled through the whole series. The sloppy material was discharged from the bottom conveyor in its hot state direct into a continuous centrifugal below, the oil flowing away by a pipe. The residual solid material could, if desired, be subjected to further treatment in hydraulic presses.

In a second lecture on the same subject on March 10th, Mr. Bellwood said it was now over 70 years since Fisher brought forward a practical scheme for the extraction of oils by volatile solvents. Solvent extraction had made very slow progress in this country, and it was only of late years that manufacturers had realised the practicability of the process. There still existed, however, a great deal of prejudice against the process, particularly as regarded the production of edible oils, but oils produced by solvent extraction had been proved to be perfectly suitable in every way for such purposes. Another objection against extraction was that an extracted oil contained more free fatty acids than an expressed oil, but that also was untrue. If more fatty acids were found in a solvent extracted oil it was simply due to the fact that the raw material had not been of equal quality to begin with.

The types of seeds that might be treated successfully on a properly designed plant were so numerous that there was a very wide scope for enterprising manufacturers. Palm kernels and copra were now being dealt with in large quantities, practically the whole of the oil being extracted. The solid residue was sold for cattle feeding purposes and commanded an even better price than the cake made by hydraulic presses.

Carbon Monoxide in Gas

GIVING evidence before the Board of Trade Committee which is inquiring into the desirability of limiting the amount of carbon monoxide in a public gas supply, Professor J. W. Cobb, on March 10, said that any such restriction would be a retrograde step. The only form in which fined carbon had been gasified on a manufacturing scale was that of carbon monoxide, therefore to limit it would involve a corresponding limitation of the gasification of fined carbon, and would operate as a direct check to the cheapening and extension of the public gas supply. He referred to various forms of plant which aimed at complete gasification of the coal, and stated thaat the development of the gas industry along the lines of fuel economy and efficiency was absolutely conditioned by the permission to introduce carbon monoxide in quantity.

Dr. Callan, of Manchester, writes to say that the report of his recent address at the Liverpool section of the Society of Chemical Industry contained a number of inaccuracies, and must not be taken on several points as representing what he actually said.

Lubricators and Lubrication

Large Field for Research

THE final lecture on Lubricants and Lubrication was delivered by Mr. L. Archbutt, F.I.C., at the Newcastle Section of the Society of Chemical Industry on March 10. Dr. J. H. Paterson presided, and there was again a very large attendance.

Mr. Archbutt said that the first lubricating oils produced in quantity came from Pennsylvania and from Russia. The Pennsylvanian oils contained paraffin wax and had a comparatively high freezing point in consequence; those from Russia contained little or no paraffin wax and had a very low freezing point, often below 0°F. There was practically no difference in specific gravity between the Russian and American oils, but there was a great difference in viscosity, especially as regards the influence of temperature on the viscosity. The Russian oils lost viscosity much more rapidly with rise of temperature than the Pennsylvanian oils. No cylinder oils were made from Russian petroleum. Chemically the Pennsylvanian oils were believed to be composed of paraffinoid hydrocarbons, saturated and unsaturated, and the Russian oils mainly of napthenes.

Little was known as to chemical constitution of mineral lubricating oils, except that they were mixtures of hydrocarbons which are only to a small extent paraffins, and are very largely napthenes, olefines, polyolefines, and other unsaturated bodies. They were also without real knowledge of the lubricating values (oiliness) of the different constituents of these oils. That was a problem which was in urgent need of investigation, and if it was not found possible to separate the different hydrocarbons from the commercial oils, the problem would have to be attacked by the synthesis of those compounds.

Semi-solid lubricants or greases should be used only where oil was unsuitable or its use inconvenient. Greases were plastic solids, and could not be so completely squeezed out from between the surfaces as a viscous oil; consequently a thicker film remained and the friction at starting was lower than when oil was used. Experiments with railway coaches had shown that a tractive force of 12-62 lbs. per ton was sufficient to move a coach from rest when lubricated with grease, whilst when oil was used a force of 18-54 lbs. per ton was required. To maintain the motion when the liquid oil film had been formed much more power was required with grease than with oil, and the running temperature of the bearings was much higher.

Cup Greases

Cup greases were usually made from mineral lubricating oils thickened by dissolving them in soap. Their consistency and melting point varied according to the viscosity of the mineral oil used, and the relative proportions of oil and soap. They were usually made hot and were sometimes melted or strained to grind up or remove all solid particles and promote uniform consistency, and the more thoroughly that was done the better the grease. Greases of that kind could be made by cold saponification with soda or other soluble base, but greases made in that way were not such good lubricants as the boiled greases. Cup greases usually contained very little water, and when used for ball bearings should contain none. A little free fatty acid might also be an advantage in ordinary greases, as it might improve the lubricating value of the grease. A little free fatty acid was preferable to free lime or free soda, as those bases were not lubricants. Greases used in ball bearings should, however, be as neutral as possible, as they required mainly to prevent rusting, to maintain the surfaces in a clean and brightly polished condition and to keep out dust and dirt, and not for lubrication, as the friction of such bearings was much the same whether they were lubricated or not. In the analyses of grease used in ball bearings, chemists should, therefore, see that they were free from water, neutral in reaction and free from mineral loading matter of all kinds which might abrade the surfaces. Graphite was not needed in ball bearing greases, and the very strong objection to its presence in greases which was held by all makers of ball bearings was due, Mr. Archbutt believed, to the fact that the majority of lubricating graphites contained some mineral matter which acted as an abrasive. Chemically pure graphite in a small quantity could, he thought, do no harm and might be of some benefit, as there was a little solid friction in such bearings.

Railway wagon grease was of quite a different type from cup grease, and as the Railway Clearing House had issued a specification of grease for private owners' wagons which was not clearly understood by manufacturers, he proposed to say something about it. Railway wagon grease was an emulsion containing up to 50 per cent. water. The ingredients used in making it were generally tallow, palm oil, mineral oil, soap and water. The soap was generally made during the process of manufacturing the grease by adding sufficient caustic soda to saponify a proportion of the fat, but sometimes it was added as a soap. Old grease, recovered from the axle-boxes of wagons which had come in for repairs, more or less refined, was usually mixed with the new grease. One company boiled its old grease with a dilute solution of caustic soda. That decomposed the copper and iron soaps formed by chemical action on the bearings and journals, and saponified some of the fat. On standing overnight the cupric and ferric hydroxides together with sand and dirt settled out. The clean liquor was then run off, while still warm, into the grease-making pans, and was there mixed with sufficient tallow, palm oil, mineral oil and caustic soda to make the new grease, the ingredients being well boiled together until saponification was completed, and then allowed to solidify. Another company boiled the old grease with water and added dilute sulphuric acid to decompose the soaps. After rejection of the frothy scum which arose, and the removal of the dirt and water which had settled to the bottom, the mixture of fatty acids and oil which remained was mixed with palm oil, tallow, mineral oil, water and caustic soda and boiled until saponified. The mixture was then run off into cooling pans and allowed to set.

Oil Filters

He did not think it was much use trying to determine the viscosity of greases as they became more fluid the more they were worked. The most useful test was to extract the mineral oil from the grease by analysis and determine its viscosity, which could easily be done by Mr. Lidstone's viscometer. Oil filters could not restore the original viscosity of the oil, and they did not usually refine the oil chemically, but they could remove mechanical dirt and water if the oil and water were not too intimately emulsified. He thought it was quite possible that a neutral oil which developed a little acidity during use might lubricate better than the original oil, owing to the pressure of the free organic acid; and an oil which was not quite viscous enough for the work it had to do, and which became more viscous in use, might lubricate more efficiently in consequence of the increase in viscosity. The usefulness of the filter consisted in the saving of oil, and in enabling such oil to be used again. He thought it probable that a great deal of oil which was at present wasted might be saved if oil filters were used more generally. Waste oils from cylinders, with very finely divided carbon in suspension, needed some means of causing the colloidal particles to coagulate, otherwise they could not be separated by filtration. Possibly such colloidal particles did not need to be completely separated. Persistent emulsions of oil and water were the most difficult to deal with, and the only method at present seemed to be to separate as much clear oil as possible from such emulsions, and reject the remainder. Centrifugal separators might be tried in such cases. Upward filtration through warm water was advantageous.

Tests for Transformer Oils

Dealing with transformer oils Mr. Archbutt said that oils used on transformers were very thin mineral oils of about the same viscosity as typewriter oil, say about 28-30 op. The flash point should not be lower than 350°F. It was customary to subject those oils to a sludging test to determine the liability of the oil to form a deposit in the transformers. In testing transformer oil it was necessary to detect traces of water, and a very delicate test was to take about 50 c.c. of the oil in a perfectly dry small distillation flask with a thermometer bulb immersed in oil. The oil was slowly heated to 250°F. (not higher), a piece of delicate test paper was made by dipping filter paper in a 5 per cent. ammonium ferrous sulphate solution, and drying and dusting over with a finely powdered potassium ferrocyanide. The least trace of moisture caused blue stains to form on the paper.

At a recent meeting of the Cleveland (Yorks) Institution of Engineers it was stated that ALCOHOL OBTAINED FROM COKE-OVEN GAS had answered all tests satisfactorily.

Patent Law and Chemical Research

The Validity of Patents

On March 7, Mr. Harold E. Potts, M.Sc., lectured on "Validity of Patents: the Historical Problem," before members of the Liverpool section of the British Association of Chemists, at the Liverpool University, Dr. H. A. Atkins presiding.

Mr. Potts said they would now see one of the chief sources of weakness of a patent, viz., the possibility of its invalidity for lack of novelty or invention.

Chemical industry was prolific in patentable inventions, and more of them would be protected by patents if the question of patentability were more generally understood by chemists. It was appreciated that patents could be obtained for Government discoveries such as viscose or saccharine manufacture, but it was not appreciated that patents could often be obtained for a choice of conditions leading to a better yield in a known process or for the application of a catalytic reaction to a new class of bodies.

Novelty was the essential condition of the grant. The determination of novelty involved the historical problem of determining the extent of public knowledge as a preliminary. Usually publication was proved by printed documents. The simplest test was usually whether the document had been laid open to public inspection on the shelves of the Patent Office Library, in London, before the dates of the patent application. If so, even if it were a book or specification in German or in French it was regarded as a publication. Publication abroad did not invalidate a patent, unless it could be proved that the knowledge reached the public in this country.

Considering the comparison between a patented process and the prior processes disclosed by publications which constituted the state of the art, Mr. Potts said that the problem was, to determine whether the new process was patentably novel, and it might be split up into two further problems: (1) A qualitative comparison of the old and new processes to determine whether they were different or identical; (2) If it differs qualitatively, a quantitative comparison to determine whether the difference is substantial enough to deserve monoply for 16 years.

Subject Matter Defined

A process which differed qualitatively from the state of the Art was said to possess "novelty," and if it differed quantitatively to such an extent as to justify patentability, it was said to possess subject matter. Novelty implied a qualitative difference between the patented process and the state of the Art. Subject matter implied that this difference had been quantitatively considered and that it was regarded as sufficiently substantial to make the patent valid.

Considering novelty first, as it was a pre-requisite of subject matter, and the quantitative determination of the existence of a difference was a simpler problem than the appraisal of the amount of that difference which was necessary to decide on as subject matter, the following points were important: (1) There is a difference between discovery and invention; (2) Commercial astuteness is not invention; (3) Very subtle differences between new and old will establish novelty if they change failure into success; (4) Novelty is not negatived by mere hints or adumbrations of the process, and a combination of known steps may be novel.

Very slight differences established novelty if they proved of commercial importance. Variations in reagents, conditions such as temperature or pressure, or even sequence of operations, might all constitute novelty.

Novelty was to be judged by a strict comparison as to adequacy of disclosure. A patent was not anticipated by vague statements, and, in any case, novelty, as distinct from subject matter, was not negatived by an analogous suggestion or a genuine statement about a class of bodies of which the patent dealt with one example. Further, while a patent might be anticipated by a number of separate documents, it must be remembered that novel combinations of old steps might be patentable. A novel combination was qualitatively different from its constituent elements or steps, old though these might be. It was clear that something more was necessary to justify a patent monopoly. An improvement might be novel qualitatively, but this was not sufficient; the difference must be considerable quantitatively before we could say there was subject matter for a valid patent.

Analogy must often be considered in patent law. It was a general proposition that the mere application of a known process or substance to an analogous purpose was not good subject matter for a patent unless there was invention in the transference from the old to the new purpose. It would be seen that such an analogous use was qualitatively novel, and the difficulty was to determine whether the amount of difference was sufficient to establish subject matter.

Artifices, the lecturer said, were often patentable. A single-stage reaction might be patentable over a two-stage reaction, if advantages were obtained.

In bringing his remarks to a close, Mr. Potts said that on novelty and subject matter the chemist was in an unusually favourable position, since he was less exposed to attacks by analogy. It followed that the results of chemical research could usually be patented and that any research chemist working on certain lines was almost certain to produce a whole series of patentable improvements.

Definition of Acids

In the sixth and final lecture on "The Definition of an Invention: the Problem of Language," on Monday, Mr. Potts said that in his earlier lectures they had considered the chief function of a specification. It was necessary that the general public should be furnished with such information about the patented invention that would enable them to work the invention at the end of the sixteen years. He was required to describe how he carried out his invention.

Taking the word "acid" for illustration, the lecturer said the history of chemistry was full of attempts to define "acids." One definition had been found which described acids as "all substances which dissociate and give up hydrogen ions on dissolution." If a substance did that it was an acid. If it did not, it was not an acid. For purposes of patent law, what we had to do was to attempt to frame a statement which would include all the members of the class which possessed the same properties of the invention, but to exclude principles which were old or would not work. A claim was a definition, and it would be obvious that the more words the claim contained the less it covered. Putting more words in the definition narrowed the scope of it. If he used the word "acid," he was referring to the whole class which by dissolution would give hydrogen ions. If he mentioned some particular acid, an organic acid or fatty acid, he narrowed it.

The claim, Mr. Potts said, might be too wide or narrow. A claim that was too narrow would contain too narrow statements. A claim might be too wide, because it might contain something which was too old or which was a failure or which was ambiguous. The cardinal difficulty of chemical patenting was to exclude from the scope of the patent something which would work, and it had been declared on high authority that if such an exclusion was not stated the claim was invalid.

Reviewing the ground he had covered, Mr. Potts said they must attempt to grasp the relevant features of the invention, and what had been done before on the same lines. Then one must include in the claim all that was necessary to cover the features for which claims for value were made. An inventor would be able to include all that was necessary. If he did not include them, it might invalidate his claim. It was better to be too wide than too narrow. If he got too broad a scheme, it could be cut down.

Preparing a Claim

In preparing a claim, a prudent man would go on the principle of claiming too much, instead of too little. An American patent agent said: "Claim the earth, and let the other fellow get it away from you."

The inventor should claim for a series; it was necessary to have a series of claims carefully graded in scope, so that if he had to cross out the second or third the remainder would be safe. Very often when a new invention was made a substance was chosen for a process which exerted two or three functions; the parts might be exercising more than one function.

In conclusion, Mr. Potts emphasised the importance of the value of co-operation between inventors and patent agents being recognised. He thought the patent system would never be of much use in this country until chemists would take trouble over inventions, and find out what the patent agent was doing. If that were done, he thought they would find the fault was not so much in the system as in the lack of co-operation between the chemist and the patent agent.

Alcohol from Coke Oven Gas

Skinningrove Methods Described

AT a Joint Meeting of the Newcastle-on-Tyne Section of The Society of Chemical Industry and the Cleveland Institution of Engineers, held at Middlesbrough on March 7, Mr. Cecil F. Tidman delivered a paper entitled "Alcohol from Coke Oven Gas."

Mr. Tidman explained that he proposed to bring to notice the work which had been carried on during the past twelve months or since the matter was first dealt with by his late chief, Mr. Ernest Bury. The importance of the subject did not need any special pleading in view of the fact that a Commission had been appointed to investigate sources of internal combustion engine spirit at home. When they realised that the national requirements of motor spirit for all purposes were something like 160 million gallons, whilst only some 30 millions of gallons of benzol plus shale oil fuels were being produced at home, they would realise the need for research in that direction. The suitability of alcohol as a fuel had been established, and he hoped to show that those claims would hold when the power alcohol had been obtained synthetically from coke oven gas. He outlined at length the research work of Berthelot, Hennel and Fritsche on the subject, and remarked that the latter had concluded that such a large scrubbing plant as would be necessary would render the proposal unworkable. At Skinningrove they decided that it was not so much a question of surface but of turbulent contact which decided the speed which ethylene would combine with sulphuric acid. Fritsche appeared to have worked along the lines of pressure, but they had considered temperature and turbulence to be essential factors in successful and rapid absorption.

Mechanical Washers

After recounting the experimental work which was done by Mr. Bury, and continued during the past twelve months, Mr. Tidman expressed the opinion that the advantage of a mechanical washer over a tower scrubber system was that the size of the plant would be greatly reduced. As he stated previously, nine scrubbers would be necessary, and the volume of six would be to hold packing material to give surface and turbulence. In considering a plant on the mechanical washer system they would require scrubber capacity similar to that now used for benzole recovery. The matter then became an engineering problem as to how to devise an apparatus which would give contact acid with gas, comparable to that obtained by the agitation in the laboratory apparatus.

When the fixation of the ethylene had been effected the recovery was best effected by a steam distillation under reduced pressure. The method they used depended on the fact that the salts of sulphuric acid were fairly stable. A quantity of the acid containing free sulphuric acid, ethyl hydrogen sulphate and traces of diethylsulphate was treated with sodium carbonate until neutral. That fixed the sulphuric acid as sodium sulphate, and the organic ester as ethyl-sodium sulphate. When distilling the neutral liquor, free alcohol came over, indicating that alcohol was present as such.

Impurities in Alcohol

Mr. Tidman dealt in detail with the question of impurities in the alcohol. He said that repeated distillations from 80 per cent. alcohol left a residue which, on cooling, deposited a white crystalline solid which could be filtered off. The solid impurity, on being examined, was found to be diethylene disulphide.

In addition to that impurity there was also a yellow oil which was found on the surface of the weak distillate, and both forms of impurity were found particularly in the first scrubber. They had not been able definitely to fix the exact bodies present. A further difficulty had been that the solid diethylene disulphide was very soluble in the oil, and, consequently, it was difficult to obtain a sample of the oil without it containing some.

Regarding the effect of the impurities on the value of the fuel he said that using an alcohol 87 per cent., without any attempt to remove impurities quite good results were obtained on a number of practical trials. As far as he was aware no bad results could be referred to the presence of diethylene disulphide. The point was, then, how to keep the impurities out of the alcohol. That was a matter of importance as the presence of the compound showed that ethylene was being used in a manner other than for the production of ethyl-alcohol. In his opinion the diethylene disulphide was formed synthetically, thus: Impure gas, that was gas containing sulphuretted hydrogen, entered the system and reacted with the sulphuric acid used for ethylene absorption thus:

$$H_2S+H_2SO_4=2H_2O+SO_2+S.$$

The sulphuretted hydrogen then reacted with the sulphur dioxide formed according to the equation $2H_2S+SO_2=2H_2O+3S$. The nascent sulphur produced by either or both of those methods was then taken up by the sulphur-forming ethylene sulphide, $\begin{matrix}CH_2\\CH_2\end{matrix}\!\!>\!S$. Polymerisation then occurred, and the diethylene disulphide was produced $S\left\langle\begin{matrix}CH_2—CH_2\\CH_2—CH_2\end{matrix}\right\rangle S$. Thus, for every 64 grammes of sulhpur thus united they had 56 grammes of ethylene used up, whereas that 56 grammes of ethylene would have produced 92 grammes of absolute alcohol. A consideration of the above reactions showed that in order to produce the maximum amount of alcohol they must first feed the absorption plant with pure gas as sulphuretted hydrogen passing forward was a drawback in two ways; firstly acid was decomposed and secondly, impure alcohol was produced.

Desulphurising Crude Gases

The problem of desulphurising crude gases was one which had occupied gas engineers for some time, and a number of patents had been taken out. The sulphur produced from that process was deposited in the form of a mud which could be easily separated from the liquid. That pure alcohol could be made from coke oven gas was certain, and that it could be made economically was to be shown. He felt sure that anyone connected with by-product work would find interest awaiting him when the problem was tackled, and only by the joint work of engineers and chemists could it be accomplished.

Mr. Bury had pointed out that a coking plant such as the one at Skinningrove with its 120 regenerative Otto ovens the make per week, allowing 70 per cent. absorption and 7 Per cent. recovery, would be 9,280 gallons of absolute alcohol. When pure gas was used, and the alcohol recovered by distillation under reduced pressure, he thought they could expect an 80 per cent. recovery, whilst using an acid stronger than 95 R.O.V. they might expect the figure of 70 per cent. absorption of the ethylene increased.

Mr. Tidman, in conclusion, referred to the assistance received from the heads of the Skinningrove Iron Co., Mr. Alfred Hutchinson and Mr. Coulson, and to the great help he had received from Messrs. Ralph Robinson, B.Sc., G. M. Harrison, and K. I. Brown.

A New French Fertiliser

A NEW liquid fertiliser is being tested by the authorities of the Department of the Isère, France. This fertiliser appears to act independently of the four principal fertilising agents, nitrogen, phosphoric acid, potash and lime. It has been stated that eleven pounds of the fertiliser will be sufficient for 2½ acres of ground. It is sold partly in the form of a salt and partly in the form of a liquid which must be added to the salt. The salt is mixed with a certain proportion of water, which results in a boiling compound, and when this has cooled off, the liquid part of the formula is added; finally, a further amount of water is introduced. The resulting liquid may be used as soon as the effervescence is terminated, but it is preferable to leave it for two or three days. The seeds are soaked in this liquid for varying lengths of time; wheat and oats must remain in the liquid five hours, barley three hours, corn four hours, while beans only need 30 minutes' treatment. The seed, which is taken out immediately it shows signs of softening, may, it is said, be planted immediately, or may be kept for a certain length of time.

The inventors claim that as this fertiliser contains the substance necessary to prevent mildew, the use of sulphate of iron, or copper sulphate, is not necessary afterwards.

THE FUEL RESEARCH BOARD have issued a pamphlet on "The Assay of Coal for Carbonisation Purposes." This is the first of a series, to be known as "Technical Papers of the Fuel Research Board."

A Ministry of Origins

The Reparation Bill from a New Angle

THE Bill introduced into the House of Commons on Friday last by the Prime Minister to provide for the recovery of the German indemnity should be carefully studied in all its details by every trader. I am not concerned with the rival schools of thought on the question of the German indemnity; I do not desire to argue either as to the wisdom of the 50 per cent. arrangement, as to its practicability or as to its effect upon the import and export of goods from or to Germany. It is obvious that the proposed collection of the 50 per cent. tax will render trade with Germany well-nigh impossible, but if that were the only probable result of the measure now before the House of Commons, I should not be concerned to discuss the matter in these pages. The Bill as drafted, however, will not only affect goods that are known to be of German origin, but will give to the bureaucrats the widest powers of inquisition into every sort and description of trade and exchange.

Hindering Foreign Trade

The German Reparation (Recovery) Bill, if it goes further in its present form, will be the first step towards the establishment of a new Ministry of Origins, which will rival in its size and its ramifications the Ministry of Health itself. In order to trap the miserable German the English trader is to be subjected to the minutest examination as to the origin of every article which he handles. One clause provides that the Commissioners shall be empowered to require "particulars in the prescribed manner as to the country of manufacture or production of *any* goods, and that if the particulars are not furnished to the satisfaction of the Commissioners the goods shall for the purpose of this Act be deemed to be goods wholly manufactured or produced in Germany." If the Bill contained no other clause than this, it would be condemned as a staggering blow to the last remaining shreds of freedom in commercial and industrial matters. There is not a shadow of a doubt that under this clause the Board of Trade or the Commissioners of Inland Revenue or both will proceed to appoint staffs of officials in every part of the country, who will be armed with powers to hold up business at every point until particulars, which in most cases the possessors of the goods will be quite unable to give, are furnished to the satisfaction of the said officials. How is it possible for the importer of an American consignment to satisfy the Commissioners of Inland Revenue as to the country of origin of every portion of the goods which he has purchased? The clause, it will be noted, covers all transactions in the goods of any country, and stands in the way of the expeditious completion of business with Italy or France just as effectually as it bars business with Germany.

Complications

As might be imagined, the bureaucratic experts are not so innocent as to allow a chance like this to slip through their fingers, and they have built upon this need for a certificate of origin a whole host of complications modelled on the exact lines familiar to those who tried to do business in the days when the Ministry of Munitions appointed a Professor of Literature to arrange a system known as Priority. No fewer than four Government Departments, the Treasury, the Commissioners of Customs and Excise, the Board of Trade and the Lord Chancellor, are all empowered under this Bill to make such regulations, to frame such schedules, to appoint such officials, and to require such particulars as they in their discretion think fit. A special clause is introduced containing the mandatory word "shall," in which the Board of Trade is to appoint Committees for the various purposes of the Act, which means that the machinery of the Military Service Tribunals is to be re-instituted in order to subject every parcel of goods upon every tradesman's shelves to appropriate processes of examination. The big new printing works which the Stationery Office has just acquired, almost as if to accentuate the already difficult problem of unemployment in the printing trade, will now be busily occupied producing large sheets of rules and regulations under this Reparations (Recovery) Act, and traders will have to re-organise their clerical staffs in order to comply with all the demands that will be made upon them in connexion with it.

A Typical Provision

Here, for instance, is a typical provision which on the face of it has an appearance of reason:—

"The Board of Trade may by order—

(*a*) reduce as respects articles of any class, make or description the proportion of the value of the goods payable to the Commissioners under this Act, or exempt articles of any class, make or description from the provisions of this Act;

(*b*) vary as respects articles of any class, make or description the percentage referred to in section two of this Act;

(*c*) extend the classes of contract to which section four of the Act relates."

The House of Commons will no doubt be cheerfully assured by Ministers that in the above respect the Bill contains every safeguard against any hardship which it might inflict upon any particular class of trader. That benevolent and far-seeing friend of industry, the Board of Trade, may be trusted to give immediate attention to any request from responsible firms to "reduce," "vary" or "extend" the provisions of the Act as it may seem desirable. But what does this mean in actual practice? The Federation of British Industries, The British Commercial Association and a thousand Chambers of Commerce will at once appoint Committees to study the damage which may be done to interests which they represent, and a stream of deputations will rush to the Board of Trade. A big new building will be commandeered, a thousand clerks with appropriate superiors appointed, and they will in due time issue long lists of reductions, variations and extensions which will puzzle and bewilder every tradesman in the land, just as surely as did the daily omissions of the Ministry of Food.

It follows, of course, that in order to secure relief from the injustices which will be wrought by this measure, the unfortunate traders who are brought up against it will be required to disclose all sorts of particulars, to be subsequently passed on to Revenue officials or profiteering officials or other departments which may exist; all these departments will promptly increase their staffs in order to deal with the new grist thus brought to their mill, and the business of earning an honest living will be made still more difficult.

The most determined advocate of heavy indemnities has no wish to add to the difficulties of English trade and commerce. These difficulties are already great enough; the absorption of unemployed, the recovery of the exchanges, the improvement in the standard of living, and the reduction of its cost all depend upon a simplification and facilitation of trade and commerce, and the business world is earnestly praying for the rapid removal of still more of the restrictive arrangements which now make things so difficult. The present criticism will be misunderstood if it is interpreted as an argument for an easement of the terms as regards our late enemy: assuming that the 50 per cent. arrangement is a proper and workable one, it will be quite easy to bring it into force without imposing upon us another army of officials. If the House of Commons would take the view that the community was composed of honest persons, and would pass a short bill requiring 50 per cent. of any specified moneys to be paid to the Commissioners of Inland Revenue, and at the same time attach heavy penalties to a wilful invasion of these provisions, the whole thing could be done with the simple assistance of half-a-dozen extra officials in the Department of the Public Prosecutor. This Bill, like most other recent legislative enactments, is simply a Bill to provide work for officials.—E.J.P.B.

Canadian Chemical Outlook

A MANUFACTURER, writing on the position of the Canadian chemical industry, which he considers has been enormously over-expanded as the result of the war, has serious fears of German competition in oversea trade, on which the Canadian chemical and electrochemical industries depend. German manufacturers, he continues, have been quoting to English buyers certain lines of chemicals at about half the prices required by Canadian manufacturers, whose London representatives in some cases have been contemplating desperate expedients to retain their customers while present conditions last.

British Chemical Industry

The Present Position Reviewed

At the Central Technical School, Liverpool, on March 3, Mr. Max Muspratt gave an interesting address on "The Present Position of the Chemical Industry in England." Mr. A. T. Smith, who presided, said it was a sad reflection that it needed a great war to bring about an epoch in the history of science. Had not the chemical industry been established in this country with men of foresight as its principals, we should undoubtedly have gone down in the war.

In the course of his address Mr. Muspratt said so much had been heard of fine chemicals in recent years that it was usually overlooked that, in volume and aggregate value, the heavy chemical branch was the largest and is the most important in the industrial life of the nation. Great Britain was the leader of the world in heavy chemicals, which partly explained the fact that she had neglected the more complex developments in favour of world expansion on the lines she knew.

Germany, on the other hand, started developing the more complex side, with British heavy chemicals as the raw material, and built up new industries almost unnoticed by the world. She then set herself to be independent of Great Britain in heavy chemicals and succeeded. British manufacturers took this philosophically, as the overseas markets offered compensations, and the stimulus which German dyes gave to the textile and other industries caused a large expansion of home consumption as heavy chemicals were used in conjunction with dyes to a tonnage far exceeding that of the dyes themselves.

Heavy Chemicals

In a world of peace the mutual advantages were obvious, and though as a nation we were to blame for our complacency, it was difficult to see, in the absence of a general staff preparing for a great war, who ought to be indicted. Fortunately there were a few isolated enterprises of varying type which acted as a nucleus, and there were many, though not enough, scientific and practical chemists, but the bedrock from which the war was won was the heavy chemical industry. The manner in which Great Britain recovered the lost ground of forty years was marvellous. Appalling mistakes were made, millions of money wasted, economic manufacture was neglected, but the volume of effort produced a sufficiently large output to overwhelm the Germans on their strongest ground.

Dealing in detail with the present condition, Mr. Muspratt said that England was equipped to meet every requirement of sulphuric acid in every possible form in which it might be needed, either now or in the unfortunate event of another war, and there was nothing which they had to learn in the final refinement of these processes which could not be acquired by a few years of experience. The alkali manufacture of England was miles ahead of any other country, and there was no neutral market in which foreign manufacturers could really stand up to us. Great Britain had considerable equipment for the manufacture of sulphuric acid, chlorine, alkali, chlorates and perchlorates, nitrogen and ammonia (especially atmospheric ammonia), fertilisers, potash, organic acids, organic raw materials, and explosives, the weak points had been discovered and remedied, with the exception of potash, and a national solution for this problem had to be found. The dye and the fine chemical industries were not yet in a position of economic independence. Great progress had been made, partly by the creation of the British Dyes Corporation, by the absorption of two British and one German undertaking and largely extending them, and there were four or five other undertakings which had made considerable progress.

Administration of Dyestuffs Act

It must be admitted, said Mr. Muspratt, that the British Dyestuffs Corporation had probably been the greatest disappointment of all war developments, and chemical manufacturers were gravely disturbed by the comparative failure of what should have been a sound and important national development. There were many able men in its personnel, its processes and plants were in the main right, but it had hopelessly failed to co-operate with either consumers or other manufacturers, and he believed that this was largely the cause of its non-success.

But even if it had made good, as some of the others had made good, it could not stand up to the full blast of its German competitors with their 40 years' experience and an abnormal exchange. As a free trader he viewed with the gravest suspicion any Government interference with trade and industry, but the national issues were too grave for them to revert to the complacent attitude of pre-war days, and the Dyestuffs Act dealt with the problem in the simplest form. Much would turn on the efficiency of the advisory committee. If the members co-operated they should develop into a co-ordination committee for the whole of the dye industry, powerful enough to insist on the deficiencies of existing conditions being rectified.

With regard to drugs the fundamental conditions were the same as in dyes. Greater individual development had already been effected, but it also was not yet in a position to stand alone, and required a few years of special treatment on the same lines as the Dyestuffs Act. The national justification for exceptional treatment of the weaker branches of chemical industry was not only to have a nucleus of productive capacity for times of emergency, but to have a schoolroom for training practical chemists, without which no nation could achieve full industrial development.

Society of Public Analysts

Ordinary Meeting

An ordinary meeting of the Society of Public Analysts was held at the Chemical Society's Rooms, Burlington House, on March 2, with Mr. Alfred Smetham (President) in the chair.

A certificate was read for the first time in favour of Mr. Percy H. Mould, and certificates were read for the second time in favour of Messrs. Jules Cofman-Nicoresti, Walter K. Fletcher, William Singleton, Francis G. H. Tate, James Darnell Granger, Ph.D., F.I.C., Ed. B. Maxted, Ph.D., B.Sc., and Russell G. Pelly, F.I.C.

Mr. W. R. Schoeller, Ph.D., was elected a member of the Society.

A paper on "The Acidity of Ink and the action of Bottle Glass on Ink" was read by C. Ainsworth Mitchell, M.A., F.I.C., in which the author gave the reason for the addition of acid to ink and the amount present in standard inks. He described acid-free inks, the estimation of acidity and the difficulty caused by dyestuff. The hydrogen peroxide method was dealt with, its limitations and uses, and the estimation of total acidity as a check on the manufacturing process. Lastly the author described the various effects of glass on ink. A number of exhibits were shown.

Mr. George Van B. Gilmour, B.Sc., A.R.C.S., then read a paper on "The Detection of Adulteration in Butter by means of the Melting-Point of the Insoluble Volatile Acids." In this he described how small amounts of coconut and palm kernel fats when added to butter lower appreciably the melting point of the insoluble volatile acids. Tables of melting points and distillation figures for pure fats and mixtures were given, also graphs showing how the melting point is affected when increasing quantities of coconut and of palm kernel fat are added.

The third and concluding lecture on "Method and Apparatus for Routine Determination of Melting-Points of Fats and Fatty Acids," by S. H. Blichfeldt and T. Thornley, described how a column of melted fat 1 c.m. long in a tube 1 mm. bore, 3 mm. diameter and 60 mm. long, is rapidly solidified on ice, and kept on ice during two hours; it is then placed in a water bath with the upper level of column 1 cm. below the surface and heated at 1°C. per minute. The temperature at which the column rises is noted as M.P. The apparatus is a rectangular glass water bath holding 20 tubes, and arranged for electrical heating, stirring and lighting.

Books Received

The Chemistry of Synthetic Drugs. By Percy May. Third edition. London: Longmans, Green & Co., pp. 248. 12s. 6d. net.

Les Vernis. By Ch. Coffignier. Paris: J. B. Baillière et Fils. Pp. 640. 40 Fr.

Red Lead and How to Use It in Paint. By Alvah Horton Sabin. Third Edition. New York: John Wiley & Sons, Inc., London: Chapman & Hall, Ltd. Pp. 139. 11s. 6d. net.

Tripoli and Diatomaceous Earth

Physical Characteristics and Uses

DISCUSSING the characteristics of Tripoli R. B. Ladoo in a U.S. Bureau of Mines report, says that, following the early confusion of names, the term "tripoli," is being reserved for the type of material found at Seneca, Missouri, as far as the United States is concerned. Diatomaceous earth properly refers to siliceous material of organic origin, containing diatoms. Pure tripoli is a white, granular, porous, siliceous rock, derived from the decomposition of chert, or siliceous limestone. Most grains are less than 0·01 mm. in diameter. Diatomaceous earth is a soft, porous rock, composed of the siliceous skeletons of aquatic plants, called diatoms, of which some 4,000 distinct forms have been noted. Pure tripoli will run 98 per cent. SiO_2, while diatomaceous earth will run slightly less than 90 per cent SiO_2, containing 5 per cent. water. Diatomaceous earth, when pure and dry, will have an apparent specific gravity less than one. Tripoli will sink in water. Under the microscope, tripoli shows rounded grains, while diatomaceous earth shows shell-like structure.

Massive tripoli may be used in the manufacture of filters. From it, extraction thimbles and Gooch filters have been turned, and tripoli flour makes a mild abrasive, and is an ingredient of scouring soaps. It is also used as a paint filler, and the finest air floated dust is used as a filler for rubber.

Action for Slander

ON Wednesday, in the King's Bench Division, before Mr. Justice Darling, a settlement was arrived at in an action for damages for slander brought by Mr. Charles Wesley Nance, against Dr. Wm. Reginald Ormondy.

Sir Hugh Fraser, appearing for Mr. Nance, explained that plaintiff had several rights for processes for tanning of hides. The defendant was a research chemist who also specialised in tanning processes. Last November, the plaintiff was negotiating the sale of some of his processes, and it came to his knowledge that defendant, in course of conversation with the two gentlemen to whom the sale was being negotiated, made certain observations reflecting very seriously upon the plaintiff's integrity. Accordingly he was obliged to bring this action. Defendant had now unreservedly withdrawn the statements he made and had undertaken to pay a sum to cover expenses and costs.

Sir Edward Carson, K.C., for defendant, said his client could not justify the statements he had made, and, as had been stated, would unreservedly withdraw them, and offer Mr. Nance a full and adequate apology. No formal judgment would be required.

His Lordship assented to the settlement of the action.

Recent Wills

Mr. P. S. U. Pickering, of Woolacombe, Devon, a chemist of international repute	£54,512
Mr. W. Arkle, of Northfield, Lancaster, chemist and druggist	6,526
Mr. S. R. Angus, of 17, Regent Street, Lancaster, chemist and druggist	£4,421
Mr. J. H. Renton, of Chelsea, formerly of Bicester, director of the Anglo-Roumanian Petroleum Co. Ltd.	£59,335

Dangerous Drugs Committee

THE Home Secretary has appointed a committee to consider the outstanding objections to the draft regulations under the Dangerous Drugs Act, and to advise what modifications can safely and properly be made, having regard to the main principles on which the regulations are based and which are essential in the public interest for safeguarding the use of the drugs. The committee is constituted as follows: Mr. Chester Jones (chairman), Sir Malcolm Delevingne, K.C.B., Captain W. E. Elliot, M.C., M.P., Major A. C. Farquharson, M.P., Mr. Gerald A. France, M.P., and Mr. W. J. U. Woolcock, C.B.E., M.P. The secretary of the committee is Mr. A. H. Anderson, of the Home Office.

Chemical Engineering Corporation

Meeting of Creditors

A MEETING of the creditors of the Chemical Engineering Corporation, Ltd., Horton Mill, Slough, was held on March 10, at the offices of Mr. W. Ellis-Hill, C.A., 244, High Holborn, W.C., liquidator.

The liquidator said the position of the company was exceedingly involved, and in the short time that had elapsed since the voluntary liquidation proceedings started, it had been found practically impossible to sift out all the various matters that were in question, but sufficient was known to him to be able to say that the position of the company was most unfortunate, and so far as could be seen, the company was hopelessly insolvent. He had to inform the creditors that there were no assets, with the possible exception of 5,000 1s. deferred shares in the Standard Tyre and Rubber Manufacturers, Ltd., but he had not been able to ascertain that these shares had any free value. In any event they could only be taken as of the nominal value of £250. On the other hand, the liabilities were very substantial. According to the books of the company they amounted to something like £42,608 10s. 2d., of which £72 7s. 7d. would rank as preferential. There were certain creditors who were stated to have claims against Mr. Mounsey's personal estate, and if they exercised their claims in this way this would automatically reduce the figure of the liabilities by £1,481 19s. 9d., and the ranking liabilities of the company would, therefore, in that event be £41,126 10s 5d.

A lengthy discussion ensued, and eventually a creditor suggested that a committee should be appointed to investigate the matter further and report to the creditors, if necessary, The liquidation meantime to be continued under the supervision of the existing liquidator.

Sir John Cass Technical Institute

Department of Metallurgy

THE Fourth Annual Dinner of the Department of Metallurgy was held at the Florence Restaurant, Rupert Street, Piccadilly, on March 12th. George Patchin, Esq., A.R.S.M., M.I.M.M., head of the department, was in the chair, and the company included present and past students of the department, the staff, and a number of distinguished guests. Among the latter were Professor Merrett, of the Royal School of Mines, Richard Davies, Esq., C.B.E., and J. G. Howell, Esq., of the Governing Body of the Institute, and Dr. Charles A. Keane, Principal of the Institute.

During the evening a presentation was made to C. O. Bannister, Esq., A.R.S.M., F.I.C., who after 18 years' work at the Institute has been appointed first professor of metallurgy at the University of Liverpool. This took the form of a silver coffee service designed by Mr. Harold Stabler and executed by Mr. W. E. Stocker, of the Art Department of the Institute.

Professor Merrett, in proposing the toast of the department, referred to the continued development of the department since the war, as shown by the increase both in the number of courses and in the number of students, the latter numbering 138 in the session 1919-20. He suggested the addition of a course on ore dressing would give greater completion to an already comprehensive curriculum.

A large congregation, numbering about 300, attended a MEMORIAL SERVICE to the late Lord Moulton in the Temple Church on Monday. Amongst the congregation were Mr. C. F. Cross, Dr. Charles Dorée and Mr. Ernest Hickson (representing the Society of Dyers and Colourists), Sir John Brunner, Sir Alfred Mond and Mr. W. J. U. Woolcock, M.P. It is understood that representations have been made to the responsible quarters for the ashes of the late Lord Moulton to be interred in Westminster Abbey.

BRITISH ALIZARINE.—Dividend of 5 per cent., tax free, for half-year, making 10 per cent. for year; £2,890 to reserve for directors' remuneration, &c., £16,000 written off buildings, plant, machinery, &c.; £12,000 to reserve, making £100,000; £15,115 forward.

Non-Delivery of Crude Naphthalene

Action Stayed on Terms Agreed

ON March 14, before Mr. Justice Roche in the Commercial Court of the King's Bench Division, Charles Page & Co., Ltd., 47-51, King William Street, E.C., claimed damages from the Team By-Product Coke Co., Ltd., Dunston-on-Tyne, in respect of the non-delivery of 86½ tons of dried crude naphthalene.

After hearing evidence on both sides, his Lordship suggested that a settlement might be arranged, and Mr. Stuart Bevan, K.C. (for the plaintiffs), announced that the action would be stayed on terms agreed, in which Mr. Justice Roche concurred.

A Fertiliser Combine

Cheaper Artificial Manures for Farmers

AN important arrangement which will have considerable bearing upon prices and supplies of artificial manures next season has just been completed between the Phosphate Commissioners, in conjunction with the Ministry of Agriculture, and Mr. George V. Parker, acting on behalf of the South Wales Basic Slag Company, Ltd., which is closely allied with the well-known steel firms of Messrs. Baldwins, Ltd., and Messrs. W. Gilbertson & Co., Ltd. It will be remembered that the mandate for the administration of the Island of Nauru, formally owned by Germany, was conferred upon the British Empire; an Act of Parliament was ultimately passed by which the United Kingdom was entitled to 42 per cent. of the yearly output of phosphate produced in the island. Mr. Geo. V. Parker has acquired the whole of this allocation of 42 per cent. of the output of phosphate rock from Nauru. Although the purchase price is not stated the amount involved constitutes by far the largest transaction which has taken place in the history of the British Fertiliser Industry, the previous largest deal having been in Florida phosphate rock which was purchased by the British Government during the war. It is anticipated that some 180,000 tons of high grade phosphate rock will be shipped during each year, and the material will be delivered to various ports here, from which it will be distributed throughout the United Kingdom. By arrangements with the Ministry of Agriculture a proportion will be sold next season as basic phosphate, at under 3s. per unit of phosphate of lime, delivered to farmers' stations. As the present quotations of phosphate of lime range from about 5s. to 7s. 6d. per unit, it would seem that the Government pledge of cheap phosphatic manures for the farmer as the outcome of the acquisition of Nauru Island is at long last going to be kept. The first consignments of phosphate rock from Nauru are expected to arrive in this country in June and July, and already one-third of the next six months production has been contracted for.

Export of Fertilisers

THE Board of Agriculture for Scotland announce that an Order in Council has been issued under the Fertilisers (Temporary Control of Export) Act, 1920, continuing in operation the restrictions which have been imposed since 1917 on the export of the following fertilisers: Sulphate of ammonia, superphosphate of lime, basic slag, and compound manures containing any of these substances. None of these fertilisers may be exported from the United Kingdom except under the authority of a licence from the Board of Trade. Applications for the grant of licences for the export of these fertilisers from Scotland should be forwarded to the Secretary, Board of Agriculture for Scotland, 29, St. Andrew Square, Edinburgh, from whom forms of application for use for this purpose may be obtained.

PREPARATORY to the formation of Benn Brothers' Social Circle a successful whist drive was held at the Eustace Miles Restaurant, Chandos Street, London, on March 4, the company numbering upwards of 80, including several members of the Board of Directors. Mrs. Ernest J. P. Benn distributed the prizes.

Delivery of Calcium Carbide

Breach Claim Settled

GIVING judgment last week in the action brought by the Acetylene Corporation of Great Britain, Ltd., against the Canada Carbide Co., Ltd., for alleged breach of contract (*see* THE CHEMICAL AGE, p. 290, March 5, and p. 309, March 12), Mr. Justice Rowlatt said with regard to the question of frustration he had to decide whether, in this case, if the parties had contemplated what happened, it was inconceivable that they would not have provided that the contract would come to an end if it did happen. The contract was made during the war when shipping was subject to great and increasing difficulties, and this was provided for in the contract by suspension. Having regard to what the parties must have known, to what they could easily have put in the contract—because it was not an unknown thing to say that suspension for a certain time could cancel the contract—he could not hold that he was to read into the contract an implication that suspension for 2½ years, or 1½ years after the termination of the contract, would have the effect of turning the suspension into a cancellation. Therefore, plaintiffs succeeded on this part of the claim.

His lordship decided that defendants were entitled to succeed on the claim for breach of control. If he awarded damages, he would be doing an absolutely unreal thing in giving plaintiffs damages for benefits which they really never could have secured. As to the last point, the claim for damages for breach of the contract to give plaintiffs the refusal of goods for a year after the termination of the contract, plaintiffs could not recover.

His lordship ordered the question of damages to be referred, if the parties were unable to come to an agreement. Plaintiffs were to have the general costs of the action, defendants the costs in respect of the issues on which they had succeeded, which would include the issue of the operation of the suspensary clause.

Commercial Use of Cellulose

LECTURING at the Textile Institute, Manchester, on Tuesday, Mr. W. Kenyon reviewed recent developments in the utilisation of cotton and other celluloses in the manufacture of textile fabrics.

Artificial silk, mercerised cotton, and paper yarn and fabrics formed, he said, the chief textile products from various celluloses, and at least two vast industries had been permanently established in this country as a result of the development. The increased manufacture of mercerised cotton and artificial silk was no doubt responsible to a very large extent for the increased variety and output of cotton goods and mixture fabrics.

The lecturer referred to the vast amount of research work which had taken place and was now taking place in regard to cellulose and ligno-celluloses generally, and he thought we might confidently expect remarkable results from the investigations and experiments proceeding to-day in connexion with various cellulose products. There was practically no limit to the demand for them.

Luncheon to Sir John Benn

A NUMBER of the friends and admirers of Sir John Benn who have been associated with him in progressive movements, have arranged a luncheon in his honour, to be held at the Connaught Rooms, on Thursday, April 7th, at 1 p.m. It was at first suggested that such a function could appropriately be held on Sir John's seventieth birthday in November last, but the state of his health at that time rendered it impossible to proceed with the idea. The Marquess of Lincolnshire, President of the National Liberal Club, has intimated his willingness to preside. In addition to his Parliamentary work, Sir John has completed thirty-two years of consecutive service, and is now the "Father" of the London County Council. The committee include: Mr. John Burns, Dr. Clifford, Lord Crewe, Dr. Scott Lidgett, Sir Evan Spicer, and others.

EXTENSIVE DAMAGE was caused by a fire on Tuesday at the works of Ayrton Saunder & Co., wholesale chemists and druggists, Liverpool.

Oil and Colour Chemists

Paper by Dr. J. N. Goldsmith

AT a meeting of the Oil and Colour Chemists' Association held on March 10, Dr. R. S. Morrell, President, in the chair, a Paper on "Analysis by Refractometer" was read by Dr. J. N. Goldsmith.

Dr. GOLDSMITH said that the use of the refractometer in chemical analysis was discussed at a meeting of the Society of Chemical Industry some time ago. He proposed to give a short historical survey on the development of the instrument, and review the growth of knowledge on the subject. A great debt was owing to Wollaston, whose instrument was the first total reflection refractometer. Wollaston also invented a reflection goniometer, which was still in use after 100 years. Reference was then made to the Abbé refractometer of 1874, and to the work of Pulfrich and Kohlrausch, and to the expressions which had been devised from time to time for specific refraction. There was no question, continued Dr. Goldsmith, that the refractometer supplied the quickest means for getting the percentage compositions of liquid mixtures which arose in the problems of the technical chemist. Density or specific gravity gave very similar information to a refractive index determination, but the time required, assuming it was desired to carry out two determinations on the same sample, to get a confirming result, was very much greater when taking the density or specific gravity as compared with taking two or three readings of the refractometer. Indeed, the refractometer was fundamental to the enquiry into constancy of volume.

Workers on aqueous solutions had employed the refractometer, and found considerable support for their theories. It was proved that changes in refractive index were caused by volume changes, and there was a very large number of aqueous solutions which gave practically straight lines if plotted against concentration. For instance, sodium iodide up to a concentration of 70 per cent. gave a straight line. The relation between composition of the solution and its refractive index could be expressed by well-known formulæ, provided notice was taken of the change of density. Reference was made to the work of Cheneveau in connection with measurements of sulphuric acid, some of whose curves were shown on the screen, and to Landof's work, particularly in regard to optical radiation. As to dispersion measurements, there was an important Paper by Fryer and Weston on the dispersion of oils, in which attention was called to the discriminating value of dispersion measurements for China wood oil. He himself had made up mixtures of China wood oil and Soya bean oil, and also paraffin oil, and endeavoured to determine the proportions both from the refractive index and dispersion measurements, and the results had come out very closely in these and other cases.

Usefulness of the Refractometer

As to the uses of the refractometer, the Abbé instrument could be used for determining melting points to a very close degree of accuracy. He had also used the refractometer for determining the constitution of soap solutions and in fact, he would not like to limit the uses of the refractometer in any way. What was very badly wanted, however, was publication of measurements.

Many technical chemists had used the refractometer, and accumulated a mass of information, but did not care to publish the results, because the work was not carried out under the strict conditions of a physical laboratory. Nevertheless, the information which had been accumulated would be of great interest for technical chemists, and was one of the reasons which stood in the way of the general use of the refractometer in the laboratory. He threw out the suggestion that the Oil and Colour Chemists' Association might act as a clearing house for information, and curves in this connection sent in by members, because he was firmly of the opinion that the refractometer was as much a tool of the chemist as the balance

Discussion

Dr. R. S. MORRELL said that after Dr. Goldsmith's Paper they would all feel more confident as to the reliability to be placed on refractometer results for ordinary technical analysis. No doubt some of them up to the present had been rather sceptical as to whether they could draw very stringent deductions from refractometer results. Dr. Goldsmith had referred to mixtures of benzol and turpentine, and he would like to know whether the refractometer method could be used for estimating the strength of mixtures of turpentine and petroleum, because in distilling off the thinner from the varnish it would be a very easy method to determine the refractive index of the distillate and straightway say how much petroleum spirit there was from the values of the refractive index. At the present moment it was necessary to carry out elaborate polymerisation tests, which were not even accurate to within 5 per cent., and he rather imagined that it would be possible to obtain a higher degree of accuracy with refractometer methods than with the polymerisation test.

Professor A. W. PORTER said his experience had been more with the interferential refractometer, mainly in connection with the refractive indices of gases, and he could claim to have determined the refractive index of air, for example, with much less air than anybody else. He had made some determinations with total reflection refractometers, but they were chiefly on the refractive indices of solids rather than liquids, and he had always been amazed with the ease with which refractive index of unpromising solids could be determined.

Mr. TWYMAN said that as a manufacturer of refractometers they could imagine the delight with which he heard of the industrial applications of them. As a manufacturer of scientific instruments, he would be glad if possible users would realise that the manufacturers did not know what their needs were, and if those who contemplated using physical tests for chemical purposes would consult the manufacturers, because there were many cases in which a special instrument could be devised which would be very much better than anything else previously evolved.

Dr. BARR said that as to the value of the refractometer for routine testing in the works there was a tremendous difference in price between a refractometer and a set of hydrometers, and the increased value of the results obtained with the refractometer were only valuable in certain cases. One great point in connection with the refractometer was that they could work with just a drop or two of the substance, and did not need to have a great big jar full of it in order to take the density accurately.

Dr. FOX said it was always surprising to him that chemists did not use the Abbé instrument much more than they did at present, because the determination was made in a few minutes, and it was specially valuable if they were buying to tender. There was, perhaps, a little danger of laying too much importance on the refractive index as a quantitative measure, but as a confirmatory observation for other things he himself would have no hesitation in using it, and if necessary, placing the results in evidence in any case of dispute. He had used the Oleo refractometer for testing various oils to a considerable degree.

Dr. GOLDSMITH said that the Oleo refractometer had disappeared. It seemed to be able to distinguish between different oils, and was extremely valuable, and something more should be heard of it.

Chemical Merchants' Affairs

CREDITORS under a receiving order made on February 23 against Ernest George Hill, lately trading as Hill Bros. chemical export and import merchants, 5, Fenchurch House, Fenchurch Street, E.C., met last week at the London Bankruptcy Court before Mr. F. T. Garton, Official Receiver.

The debtor had stated that in the summer of 1918 he entered into partnership with his brother Arthur John Hill. In August, 1919, he converted the business into a limited company with a nominal capital of £30,000, and as vendor he received 7,000 shares of £1 each. The company traded successfully for a time, but owing to the slump in trade, depreciation in the value of the stock and loss on the exchange of francs and lire, a compulsory winding-up order was made against it in January last.

No statement of the debtor's affairs had yet been lodged, but the liabilities were estimated at £450, apart from certain guarantees and a disputed account. No assets were disclosed, the debtor's shares in the company being valueless. He attributed his insolvency to the failure of the company and consequent loss of income and to heavy interest charges.

The case was left in the hands of the Official Receiver for administration in bankruptcy.

Society of Chemical Industry

London Section

A MEETING of the London Section was held on March 7 in the rooms of the Chemical Society, Burlington House, Piccadilly, Mr. Julian L. Baker, Chairman, presiding, when a paper on "Factors Influencing the Food Value of Lard and Lard Substitutes" read by Dr. J. C. Drummond was followed by a paper on "The Stability of Benzoyl Peroxide" by Dr. R. C. Farmer.

Food Value of Lard

Dr. DRUMMOND said that until recently the food value of lard was judged very largely on the calorific value. Digestibility, therefore, came in, but that point of view had been modified considerably since the work of Professor Hopkins in 1912, which showed that other factors came into consideration in judging the food value of lard and edible oils. The outstanding feature of Hopkins' work was that these substances must contain what was known as the vitamine A or the fat soluble vitamine.

On the average it was found that vegetable oils contained as much vitamine as the majority of animal oil, and that the chief factor influencing the amount of vitamine in animal fat was the diet of the animal, and that both in the case of vegetable and animal oils the methods of extraction and refining did not appear to influence the final result to any appreciable extent.

Some work had also been done on lard substitutes, the majority of which on the market did not contain vitamine A. They generally consisted of a mixture of cotton-seed oil and oleo stearine, and such vitamine as there is present was usually destroyed in the process of manufacture. The hardening of fats also had the effect of destroying the vitamine, and in every case of hard and hydrogenated fats there had been found an almost complete absence of this vitamine A.

A discussion followed in which Dr. Monier-Williams, Capt. Golding and Messrs. Parkes, Thornley, Hulton and Bolton took part.

The Stability of Benzoyl Peroxide

Dr. R. C. FARMER said that the most important uses of benzoyl peroxide were in connection with oils. It acted as a drier towards linseed oil and other drying oils, and it was also used as a decolourising agent for a number of oils, although it was rather limited in its decolourising action on oil. Benzoyl peroxide also had a limited use for explosive purposes, and had been used in electric detonators at low tension, as its lower temperature of explosion made it easily detonated by warming up by electric currents. These various uses made it necessary that it should be stored and handled safely, and it was for this reason that he had wished to submit a note on the stability and possibility of explosion.

Benzoyl peroxide had generally been assumed to be quite stable for handling and storing, and he had been emphatically informed that it was perfectly safe and could not by any possibility explode. His experience had been, however, that benzoyl peroxide did explode, and at times rather easily.

As indicating the relative stability of benzoyl peroxide with some other substances regarded as highly explosive, Dr. Farmer said that tetryl, which was the least stable of the explosives, gave 1 cc. of gas per gramme in 1,500 hours at 100 deg., or 5,000 hours at 80 deg., whilst with T.N.T., which was more stable, the period was 20,000 hours for the same evolution of gas at 100 deg. Therefore, it was evident that benzoyl peroxide possessed a very low degree of stability when put alongside any of the recognised explosive compounds. In a state of extreme dryness the tendency to explode increased, whilst the grinding of benzoyl peroxide in a mortar had also given a slight explosion.

Storage and Handling Precautions

Having found that benzoyl peroxide exploded and decomposed at a perceptible rate at temperatures as low as 50 deg., it became a question of the precautions necessary in the handling and storing of it. As regards decomposition at 50 deg., he was afraid there was nothing which would prevent it from decomposing at that temperature, and it was, therefore, necessary to store it in a cool place. As regards explosive decomposition, that was a thing which could be distinctly guarded against, because if the material were being stored in quantities of a hundredweight or more, the explosion would probably be a serious matter. In the preparation of the compound, so long as it was in the wet state at any ordinary sort of temperature, it was practically free from any danger, and it was only in the drying of the compound that any danger came in. If it could be stored wet he would recommend that that should be done, and when it was necessary to dry it, he had dried it by mixing it with salts, so that the particles of the benzoyl peroxide would be separated from one another, and it would not be possible for the explosion to be communicated from one particle to the next. If mixed with four or five times its quantity of common salt while still wet, and then dried, the benzoyl peroxide would disseminate throughout the salt, and could then be heated with safety to 100 deg.

Edinburgh and East of Scotland Section

The members of the Edinburgh and East of Scotland Section of the Society of Chemical Industry held their annual general meeting in the hall of the Pharmaceutical Society of Great Britain, 36, York Place, Edinburgh, on March 8, Dr. Jerdan, the retiring chairman, presiding.

The first business was the appointment of office bearers for the ensuing year, and these were elected as follows:—Chairman, Dr. H. E. Watt; vice-chairman, Mr. W. A. Williams; hon. secretary and treasurer, Dr. A. Lauder, 13, George Square; members of committee, Mr. A. M. Cameron, Mr. J. W. Romanes, Mr. W. N. Stokoe, Mr. B. D. W. Luff, Major R. Bruce, Mr. Adam Tait, Dr. J. F. Tocher, Mr. W. T. H. Williamson, Mr. C. Norman Kemp, Mr. J. Rutherford Hill, Mr. Harold H. Baxter, and Mr. J. A. Watson; auditor, Dr. Pettie.

Mr. J. Rutherford Hill said he had been called upon to voice what he was sure was the unanimous sentiment of the section when he said they had had a very interesting and successful session, and the interest and success of their meetings had been in no small degree due to the general and gracious manner in which the chairman had presided over their gatherings. Altogether the section might congratulate itself on the way the chairman had conducted the business during the past year. With regard to their hon. secretary, his services were invaluable, and the testimony from Dr. Longstaff was so much like their own experience that he was not at all surprised to hear such a high commendation of Dr. Lauder's work. He proposed a hearty vote of thanks to Dr. Jerdan and all those who had been associated with him in the excellent work they had done.

Dr. Jerdan said he could only say that it had been a very great pleasure to himself, to Dr. Lauder, and the other members of the committee to do the work. He added that Dr. Longstaff, the secretary of the society, had remarked on the punctuality and regularity with which Dr. Lauder had made his returns, and had said their section was one of the liveliest sections in the society.

Dr. Lauder then submitted the report of the work of the past session. They had had six ordinary meetings, at each of which papers had been read. The report noted the change in the meeting place to the Pharmaceutical Society's hall, where they had more accommodation. The average attendance at the meetings had been about 40. As regarded the membership, he said that at the end of 1920 they had 159 members. They had lost 12 by death and resignation, and 10 had been transferred to other sections, leaving 137; they had received 20 new members, making 157 instead of 159 at the beginning of the session. This was the first occasion on which they had to record a falling off, and he appealed to the members to try and put this right in the coming session. He referred to the resignations of Dr. Jerdan and Dr. Cumming, who were going to other spheres of work. The section felt they would be a very serious loss, for both were extremely useful members. The report was adopted.

Dr. W. W. Taylor, Physiology Department, Edinburgh University, then delivered a lecture on "Some Recent Work on Colloids."

After a brief but comprehensive review of the important properties of gelatine—the phenomena connected with such things as solgel transformation and the viscosity and osmotic pressure the lecturer described in considerable detail the recent investigations of Loeb and his co-workers, on the effect of electrolytes, and particularly of salts on these properties of gelatine.

The lecturer then dwelt on the important work of Smith on the muta rotation of gelatine; in which he has demonstrated the existence of two forms of gelatine, with different specific rotations, the one form (sol form) stable at temperatures of 35° and above, and the other (gel form) stable at ordinary temperature. The ebaring of this on the investigation of the above phenomena, in all of which there is a possibility of this sol-gel transformation occurring during the experiments, does not need to be emphasised.

In conclusion, some of the recent books which have appeared were briefly reviewed, including Searle's Colloids in Health and Disease."

Colour in Natural Waters

Its Nature and Removal

AT a meeting of the Birmingham and Midland Section of the Society of Chemical Industry held on March 10, at the University of Birmingham under the presidency of Dr. Brownsdon, Mr. Joseph Race, F.I.C., delivered a lecture on "Colour in Water."

There are many colours in natural waters, said Mr. Race, but the only one that is of commercial importance is brown. The brown waters may be divided into two categories, (*a*) in which the colour is mainly organic, and (*b*) which includes such ferruginous waters as produce the typical ochre streams of mining districts, the latter being of relatively minor importance. The colour of the waters in the first category is generally regarded as due to the presence of the products of putrefactive processes in vegetable matter, but in the coloured waters which supply Lancashire and Yorkshire the colour is not so high and is derived from the peaty soil. The decomposition products found in peat, &c., include humic, ulmic, crenic, apocrenic and other acids, and investigators like Adeney and S. Rideal have shown that such acids combine in the colloidal state with ammonia, lime and magnesia, and impart a brown colour to the liquid. In some cases there are insufficient bases to neutralise the products of decomposition and the waters are acid in character. Iron also appears to play an important role in coloured waters, for in many instances the colour bears a direct relation to the iron content.

Blitz and Krohnke showed in 1904 that part of the organic matter in water was colloidal in character, and as it migrated to the anode under the influence of the electric current, was negatively charged, but it was not until 1916 that the practical importance of the relationship was established.

Flocculating Agents

Long before the chemistry of colloids was established it had been recognised that aluminium and iron salts, usually alum and alumina ferric, were the most efficient and flocculating agents that could be employed. It is now recognised that the efficiency of the salts of aluminium and iron is due to the fact that the coagulating power of an ion is proportional to the valency. Basic sulphate of alumina is regarded sometimes as being difficult to dissolve, but this is not correct. The porosity of the material which determines the rapidity of solution is influenced by the method of manufacture, the temperature of the acid being the chief factor.

Deduction of Acidity

The precipitating effect of aluminium hydroxide is much less than that of sulphate. Negative ions (alkalies) should not be added before or with alum unless there is a serious deficiency of alkalinity in the water. If the addition of a base is necessary for the reduction of acidity it should be added after coagulation or after filtration.

By the addition of sulphate of alumina, observed Mr. Race, to a water containing bicarbonates of calcium and magnesium there is a reduction of alkalinity somewhat in accordance with the equation—

$$Al_2(SO_4)_3+3CaCO_3+3H_2O=Al_2(OH)_6+3CO_2+3CaSO_4.$$

If neutral sulphate were used, the alkalinity, calculated as $CaCO_3$, should be reduced by 6·43 p.p.m. for each grain per gallon, but the daily analyses made at many American plants show that the loss of alkalinity is rarely in accordance with the theoretical as calculated from the sulphate (SO_3) content of the added alum.

Chemical Matters in Parliament

German Reparation (Recovery) Bill

THE German Reparation (Recovery) Bill was presented in the House of Commons on March 11 and was read a second time on Monday. The House went into Committee on the Bill on Wednesday.

Nauru Island Phosphate

IN a written reply (House of Commons, March 10) to Sir B. Stanier, who asked the Minister of Agriculture if he is testing the value of the Nauru Island phosphate, and, if so, where; and what is its agricultural value? Sir J. Gilmour said the Ministry has recently arranged for the importation of a sample of Nauru phosphate for experimental purposes. Arrangements have been made with the Sibthorpian Professor of Rural Economy at Oxford, the Agricultural Department of the Armstrong College, University of Durham, and the Harper Adams Agricultural College to test the agricultural and chemical value of this material for direct application to the soil in this country. I may add that its value as a raw material in the manufacture of superphosphate has long been established in Australia, Germany, Japan, and elsewhere.

Fertiliser Stocks

Sir B. Stanier (House of Commons, March 10) asked the Minister of Agriculture if he can give any estimate of the supplies in hand of rock phosphate, superphosphate, basic slag, kainit, nitrate of soda, and guano available for farmers to buy for the forthcoming season?

Sir J. Gilmour, in a written reply, stated that the following stocks were held in the United Kingdom on January 31, 1921: basic slag, 39,000 tons; superphosphate, 150,000 tons; rock phosphate, 173,000 tons; and nitrate of soda, 77,000 tons. The whole of these stocks are available for sale to farmers during the present season, although some proportion of them will be put on the market, in the form of compound fertilisers. Rock phosphate is at present almost entirely used for the manufacture of superphosphate and compounds. There are at present no stocks of Peruvian guano in the country available for sale to farmers, but the arrival of a cargo is expected in March. The Ministry has no actual figures of the stocks of kainit or sylvinite (French kainit), but it is informed that, although the stocks of kainit are at present insufficient to meet the demand in England and Wales, adequate supplies are expected to be forthcoming; and that the stocks of sylvinite at the ports are ample to meet any demand, and can be increased at the shortest notice.

Key Industries Bill

Captain Bowyer (House of Commons, March 10), asked the Prime Minister whether, in view of the promise which he gave last Session that the first measure introduced this Session should be the Bill dealing with key industries and depreciated rates of exchange, he will give an undertaking that this shall be the next Bill introduced; and whether he will introduce it forthwith, so that industrialists throughout the country may have full time to examine it before the Second Reading is taken?

Sir R. Horne: I have been asked to reply to this question. The Bill is to be introduced and proceeded with immediately after Easter.

Captain Bowyer: Can the Bill be printed, so that in view of the anxiety which prevails those who are concerned may lay their plans?

Sir R. Horne: The Bill as printed might raise false hopes to which the House of Commons might not give effect.

Mr. D. Herbert (House of Commons, March 14) asked the President of the Board of Trade if a number of chemical glassware manufacturers had been keeping their works open relying upon the hope of a Key Industries Bill being introduced as a first measure of this session, and are now greatly discouraged by the delay in introducing such a Bill; and whether he can give an assurance that the Bill will be pushed forward as soon as the pressure of financial business permits of time for dealing with legislation?

Sir R. Horne: I am aware of the serious position of manufacturers of chemical glassware. As regards the second part of the question, I would remind my hon. Friend of the statement recently made on behalf of the Government in this House (*see* THE CHEMICAL AGE, p. 291, March 5) that the Bill for the safeguarding of industries will be introduced and proceeded with as soon as possible.

From Week to Week

THE DEATH is announced from New York of Dr. Louis A. Dreyfus, manufacturing chemist.

EXPORTS OF CHEMICALS from Spain in 1920 were 7 per cent. more than in 1919 and 17 per cent. more than in 1918.

It is announced that the election of Sir WILLIAM DUNN, Professor of Biochemistry, will take place at Cambridge on April 19.

THE DEATH has occurred, at Bury, of Mr. Henry Whitehead, M.V.O., a director of the Bleachers' Association and a number of industrial concerns.

Experiments in SOLDERING ALUMINIUM by using a mixture of from 1 to 10 parts of phosphor-tin to 100 parts of zinc have been conducted in Canada.

CHEMICAL WORKERS are offering opposition to the proposal of the Chemical Employers' Federation to reduce wages and adopt a sliding scale on April 1.

The Southern Fertiliser & Chemical Co., Savannah, have INSTALLED A NEW FERTILISER PLANT with an annual capacity of 100,000 tons of acid phosphate.

Mr. H. ASTBURY, A.M.I.M.E., Empire House, Birmingham, is representing Meldrums, Ltd., of Timperley, in the Birmingham and Black Country area.

A NEW PROCESS for the recovery of potassium chloride and borax in marketable form from natural brines is being worked at Keeler, California.

Under their PROFIT-SHARING SCHEME with employees, the Bradford Dyers' Association, Ltd., have this year allocated £160,000, making £720,000 in four years.

According to the Dominion Bureau of Statistics, Ottawa, the AMOUNT OF CAPITAL INVESTED in the Canadian chemical and drug manufacturing industry in 1918 was $26,029,530.

DR. M. O. FORSTER is to preside over the Chemistry Section of the British Association for the Advancement of Science at the meeting to be held in Edinburgh from September 7 to 14.

William Russell, John Worth, R. Hallwood and J. Saunders, employees of the United Alkali Co., Ltd., Widnes, were FATALLY GASSED at the Company's electric power station on Tuesday afternoon.

Mr. Leon Simon, speaking on Tuesday at the Sociological Society on "The Hebrew University in Jerusalem," said it was proposed to begin with THREE RESEARCH INSTITUTES, for physics, chemistry and biology.

The directors of Cumming, Smith & Co., Ltd., of Melbourne, Victoria, have offered £5,000 towards the erection and equipment of a RESEARCH LABORATORY AND LECTURE THEATRE for the Melbourne University.

It is reported that German manufacturers are producing by chemical means IMITATIONS OF VALUABLE FURS, which appear so realistic that they are, it is stated, having a serious effect on prices in the fur markets.

The Senate of the University of London on Wednesday adopted a resolution for the CONTINUANCE OF THE PHYSIOLOGICAL LABORATORY at the University headquarters at South Kensington until the end of the session 1922-23.

Speaking on March 11 at the annual meeting of the Rosario Nitrate Co., Mr. T. V. Anthony (the Chairman) said there was still HEAVY OVER-PRODUCTION IN THE NITRATE INDUSTRY, despite the considerable demand for the product from European countries.

At a meeting of the committee of the CHEMICAL INDUSTRY CLUB on Monday evening it was decided on the suggestion of the chairman, Dr. Hodgkinson, to send to Lord Moulton's family a message of condolence and of appreciation of his lordship's services to chemical industry.

At a meeting of the Council of the Royal Society of Arts held on Monday, the chairman, Mr. Alan A. Campbell Swinton, F.R.S., in the unavoidable absence of H.R.H. the Duke of Connaught and Strathearn, K.G., President of the Society, presented the ALBERT MEDAL of the Society to Professor Albert Abraham Michelson.

An American company has been formed to manufacture a device for the EXTRACTION OF TURPENTINE FROM PINE TREES by a new method. The device is known as the Colgan gum extractor, and its inventor, who has spent several years in research work, claims that the method will virtually revolutionise the turpentine business.

Mr. W. J. U. WOOLCOCK, M.P., who was to have delivered an address at the monthly meeting of the Chemical Industry Club on Monday evening next, is unable to keep the engagement owing to official duties. In the circumstances Dr. Ormandy has undertaken to give an address to the members on "Electric Shadows and Wireless Telegraphy."

It is reported that the United States CHEMICAL WARFARE SERVICE has offered a reward for the invention of protective clothing, following a statement that the same department has discovered a liquid poison three drops of which, it is claimed, will kill any one whose skin it touches. It is further stated that almost every nation possesses practically an unlimited supply of the necessary raw materials.

The UNITED STATES POTASH PRODUCERS' ASSOCIATION has issued a preliminary report on the production of potash in the country during the year 1920. The total output of the country during the year was 175,541 tons of crude potash in the form of various salts while the available content of potash was 48,684 tons. This figure represents a 60 per cent. increase over the production in 1919, and almost equals the record production of 1918.

At a recent meeting of the Durham University Philosophical society (Chemical and Physical section) at the Armstrong College, Newcastle, DR. ALEXANDER FLECK gave an address on "Atomatic Structure from a Chemical Standpoint." Dr. Fleck, who is now manager of the Castner-Kellner Alkali Co., Wallsend-on-Tyne, was engaged in research work on the constitution of the atom with Professor Soddy, who is now Professor of Chemistry at Oxford.

At the meeting of the Faraday Society to be held on Tuesday next in the rooms of the Chemical Society, Burlington House, Piccadilly, papers will be read on "The Forms of Electro-deposited Iron and the Effect of Acid upon its Structure. Part I. Deposits from the Chloride Bath," by W. E. Hughes; "The Electrolytic Recovery of Zinc," by S. Field; and "Notes on the Electrolytic Reduction of Glucose," by Professor A. Findlay and Vernon H. Williams.

The list of PRODUCTS COVERED BY THE DYESTUFFS (IMPORT REGULATION) ACT, which has been drawn up in consultation with the Dyestuffs Advisory Licensing Committee, is now available and may be obtained on application either to the Board of Trade, Industries and Manufactures Department, Great George Street, Westminster, London, S.W.1, or to the Dyestuffs Advisory Licensing Committee, Board of Trade, Danlee Buildings, 53, Spring Gardens, Manchester.

It is reported that Mr. G. C. Calvert, of the Metropolitan Laboratories, Twickenham, has claimed to have discovered a new PROCESS FOR THE MANUFACTURE OF SYNTHETIC ALCOHOL on a commercial scale. The process, it is said, includes the conversion of carbon into water gas, which is passed through an apparatus after being mixed with other gases according to the product required, the alcohol being collected in a receiver. By this means, it is said, in the case of methyl alcohol a yield of 80 per cent. of the theoretical is obtained at an enormously reduced cost, which would enable it to be used as a liquid fuel favourably with producer gas, which has been proposed as a heavy vehicle fuel.

WRITING from Cologne, the British Commercial Secretary states that according to the *Kölnische Zeitung*, the Farbwerke Vorm. Meister, Lucius and Breuning, at Hoechst, on the Main, is participating to the extent of one-half in the firm of Dr. Alexander-Wacker-Gesellschaft fur electrochemische Industrie G.m.b.H. at Munich. The original capital of the company has been increased to 75 million marks. The Wacker-Gesellschaft, which was founded in 1914, has erected large plant in Burghausen in Upper Bavaria, where, among other chemical products, synthetic acetic acid, carbide, and trichlorethylene are produced. The company is at present occupied in constructing, with Government co-operation, a 40,000-H.P. water station on the Upper Alz. The utilisation of this water power requires further development of the Burghausen works.

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Patent Literature

Abstracts of Complete Specifications

158,447. PHENOLIC BODIES AND ALDEHYDIC COMPOUNDS. Vickers, Ltd., Vickers House, Broadway, Westminster, the Ioco Rubber and Waterproofing Co., Ltd., and W. H. Nuttall, Netherton Works, Anniesland, Glasgow. Application date, December 15, 1919.

In the production of synthetic gums by the condensation of phenolic bodies, such as phenol, with aldehydic compounds, such as formaldehyde or a compound capable of producing formaldehyde, in the presence of catalysts, the gum obtained has been coloured by the presence of coloured oxidation products. It is now found that this oxidation may be prevented by the used of hydrazine as a catalyst. If the reaction is stopped at an early stage, plastic, fusible substances are obtained which are soluble in alcohol and suitable for varnishes. If the condensation is continued, a hard, insoluble, infusable gum is obtained.

158,586. PYROXYLIN SOLVENT AND PYROXYLIN COMPOSITIONS CONTAINING THE SAME. E. M. Flaherty, Parlin, N.J., U.S.A. Application date, July 8, 1919.

A solvent for pyroxylin consists of normal butyl acetate and a higher homologue of benzene, such as toluol, xylol or solvent naphtha, with or without an alcohol, such as butyl alcohol. This solvent is non-hygroscopic and free from the precipitation of the pyroxylin.

158,614. GAS PRODUCERS, VALVES FOR. A. Hall, Provident Villa, Winterton Road, Darwen, Lancs. Application date, October 30, 1919.

A gas valve for controlling the passage of gas from a producer is composed of a circular disc mounted on a spindle which passes through the cover of the valve box. The spindle is screw threaded outside the box, but passes through a square hole in the cover, so that it is non-rotatable. The valve is operated by means of a capstan nut, and is formed with a square boss, so that after removal of the cover it may be rotated by a suitable tool to clear away deposits of tar or soot on the seating.

158,620. WATER, PROCESS FOR THE SOFTENING OR PURIFICATION OF. B. F. Rushton, Victoria Avenue, Unley Park, South Australia. Application date, November 3, 1919.

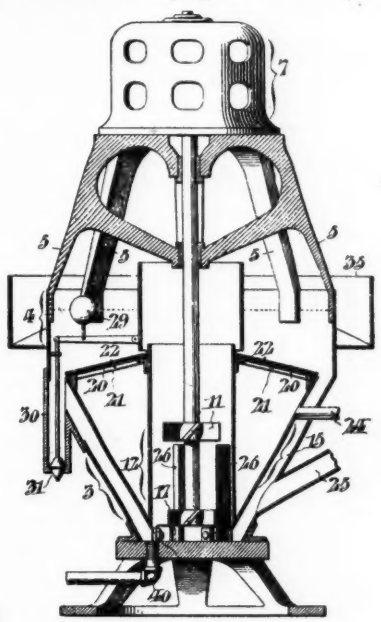
Water containing dissolved mineral matter is subjected to electrolysis between electrodes of carbon, zinc or iron, the voltage being about 25 volts. After 45-60 minutes the electrodes are withdrawn and the water agitated by an electrically-driven agitator and slaked lime added. The mineral matter is thus precipitated and is allowed to settle.

158,622. COAL, LIGNITE, SHALE AND LIKE MATERIALS, APPARATUS FOR THE CARBONISATION OF. G. F. Bale, 4, Featherstone Buildings, Holborn, London, W.C.1. Application date, November 4, 1919.

A tapering vertical cast-iron retort is surrounded by a concentric casing, leaving an annular space, into which gas burners project at the lower end to heat the retort externally. Steam and air are admitted to the retort at the lower end, and an annular channel is provided at the top to collect the distillate. A horizontal discharging ram is provided at the bottom of the retort, and a predetermined quantity of carbonised material is automatically removed at each alternate stroke of the ram.

158,708. ORE SEPARATING DEVICES. A. H. Jones, Tonopah, Nev., U.S.A. Application date, November 11, 1919.

The apparatus is for the flotation type of ore-separating processes, and the mixture of ore pulp and frothing agent is agitated by a combination of mechanical and pneumatic means. A conical casing, 3, is surmounted by converging arms, 5, carrying an electric driving motor, 7, for the mechanical agitators 11, 17. An inner concentric cone, 15, is connected at the bottom to a concentric cylinder, 12, and the annular space thus formed is covered by a closely woven fabric, 22, supported on radial arms 20, and a perforated metal diaphragm, 21. Ore pulp mixed with the frothing agent is admitted through the pipe 25 to the space between the two cones, and an upward current is created through the cylinder 12 by the mechanical agitators 11, 17, assisted by baffle plates 26. The mixture overflows at the top on to the diaphragm 21, 22. Compressed air is admitted to the interior of the annular conical chamber by the pipe 24, and is forced in a finely divided condition upwards through the pulp on the diaphragm. The froth carrying the ore values overflows



158,708

the cylindrical rim 4 into a discharge launder, 35. The gangue accumulates in the hopper 30, and is periodically discharged by a valve, 31, operated by a float, 29. The apparatus may be completely discharged through the pipe 40.

158,713. RUBBER, PROCESS OF DEVULCANISING. J. Smith, 12, Terregles Avenue, Pollokshields, Glasgow. Application date, Dec. 24, 1919.

The rubber is finely divided, impregnated with alkali, and then heated in a closed chamber by steam until a pressure of 100 lb. per square inch is obtained. The rubber is then washed until free from alkali and sulphur. Reference is directed in pursuance of Section 7, Sub-section 4 of the Patents and Designs Acts, 1907 and 1919 to Specifications 11,159/1899, 17,313/1904, 2,655/1905, 29,878/1912 and 28,167/1913.

NOTE.—The following specifications, which are now accepted, were abstracted in THE CHEMICAL AGE when they became open to inspection under the International Convention: 135,197 (Naamlooze Vennootschap Nederlandsche Lichte Olie Maatschappij), relating to conversion of high into low molecular hydrocarbons, see Vol. II., p. 130; 136,841 (A. Welter), relating to crystallised soda, see Vol. II., p. 210; 137,034 (L. M. E. Wang), relating to ammonium perchlorate, see Vol. II., p. 235; 137,834 (H. Frischer), relating to concentration of nitric acid, see Vol. II., p. 338.

International Specifications not yet Accepted

156,140. LUBRICATING OILS. H. Plauson, 14, Huxter, Hamburg, Germany, and J. A. Vielle, 17, Waterloo Place, Pall Mall, Westminster. International Convention date, December 12, 1919.

A mixture of tar oil with steam superheated to 300°C. to 400°C. is passed through a constricted tube of iron or ferro-silicon which is heated at the constriction to 500°C. to 900°C. The tube contains a catalyst consisting of carbon, silicic acid or its compounds with alkaline earth metals or heavy metals, and metals such as iron, aluminium, nickel, copper, zinc, tin and their alloys. Magnesium compounds are mentioned as being particularly suitable. The product is fractionally distilled, yielding lubricating oil and turpentine and benzene substitutes.

156,141. FATTY ACIDS. H. Plauson, 14, Huxter, Hamburg, Germany, and J. A. Vielle, 17, Waterloo Place, Pall Mall, Westminster, International Convention date, June 4, 1919.

Paraffin is treated for 10-15 hours with oxygen or air at 5-10 atmospheres pressure and a temperature of 120°C. to 150°C. About 16 to 18 per cent. of volatile products are formed and drawn off, and 60 to 70 per cent. of the paraffin is converted into saponifiable fatty acids. In other examples, a mixture of paraffin with montan wax or ceresine is similarly treated.

156,142. COLLOID POWDERS, &c. H. Plauson, 14, Huxter, Hamburg, Germany, and J. A. Vielle, 17, Waterloo Place, Pall Mall, Westminster. International Convention date, August 29, 1918.

Colloid substances are converted into products closely resembling the sol form by disintegrating them between rapidly moving surfaces in a dispersion medium as described in 155,836 (*See* THE CHEMICAL AGE, Vol. IV., p. 313). The liquid medium may then be evaporated off leaving a powder or paste. Examples are given of the dispersion of gelatine in alcohol, benzene, petroleum, chlorinated hydrocarbons, ketones, or oils, and the dispersion of glue, agar agar, tragacanth, gum, starch, dextrin, carragheen moss, yeast, casein, albumen, phenol, condensation products, rubber, cellulose esters, &c., in various media, with the addition of various coagulating agents, &c.

156,143-4. INDIARUBBER SUBSTITUTES. H. Plauson, 14, Huxter, Hamburg, Germany, and J. A. Vielle, 17, Waterloo Place, Pall Mall, Westminster. International Convention date, February 25, 1918, and December 13, 1919.

156,143. A mixture of linseed oil, oleic acid, and rubber solution is treated with sulphur chloride to produce a soft rubber-substitute. If metallic oxides and antimony sulphide are added, an ebonite substitute is obtained.

156,144. Addition to 156,143. Flowers of sulphur is used as the vulcanising agent.

156,145. DIOLS AND DIOLEFINES. H. Plauson, 14, Huxter, Hamburg, Germany, and J. A. Vielle, 17, Waterloo Place, Pall Mall, Westminster. International Convention date September 18, 1916.

A mixture of aliphatic aldehydes and ketones, or a condensation product such as ketobutanol or hydro-acetyl-acetone is electrolysed to prepare diols. Many examples are given. Diols may be treated with halogen acids to produce dihalogen substituted paraffin hydrocarbons, or they may be treated with phosphoric acid or other dehydrating agent to produce diolefine hydrocarbons.

156,146-7. ACETALDEHYDE AND ACETIC ACID. H. Plauson, 14, Huxter, Hamburg, Germany, and J. A. Vielle, 17 Waterloo Place, Pall Mall, Westminster. International Convention dates, July 5, 1918, and September 6, 1918.

156,146. Liquid acetaldehyde is oxidised to acetic acid in the presence of salts containing water of crystallisation as catalysts, such as acetates of nickel, cobalt, manganese, chromium or copper, alums, &c. The formation of peracetic acid is thus prevented.

156,147. Acetylene is passed through a porous anode containing an insoluble mercury compound, the electrolyte being phosphoric acid. If the potential difference is below that of the decomposition of water, acetaldehyde is produced, and if the potential difference is above that amount, acetic acid is produced.

156,148. FORMALDEHYDE; METHYL ALCOHOL. H. Plauson, 14, Huxter, Hamburg, Germany, and J. A. Viel'e, 17, Waterloo Place, Pall Mall, Westminster. International Convention date, September 9, 1919.

A mixture of methane and carbon dioxide is passed slowly through a constricted tube which is heated at the constriction, and a mixture of formaldehyde and methyl alcohol is produced. The tube may contain or be constructed of copper, silver, nickel or alloys of these with aluminium, tin or zinc.

156,151. SYNTHETIC RESINS. H. Plauson, 14, Huxter, Hamburg, Germany, and J. A. Vielle, 17, Waterloo Place, Pall Mall, Westminster. International Convention date May 24, 1918.

Phenols are condensed with formaldehyde or its polymers in the presence of vinyl compounds or polymerisation products and small quantities of an organic anhydride or superoxide or non-explosive ozonide. Details are given.

156,152. ACETALDEHYDE AND ACETIC ACID. H. Plauson, 14, Huxter, Hamburg, Germany, and J. A. Vielle, 17, Waterloo Place, Pall Mall, Westminster. International Convention date, May 24, 1918.

A mixture of acetylene and steam is passed through a tube of steel, iron, nickel steel, aluminium steel, nickel copper, ferro-silicon, or nickel or steel coated with platinum, iridium, osmium, gold, &c., heated to 250°-300°C. The gas is at 5-10 atmospheres pressure, and small quantities of acids are preferably added. Acetaldehyde is produced, or acetic acid may be obtained by introducing oxygen into the middle of the reaction tube.

156,170. AMMONIUM SULPHATE. Koppers Co., Union Arcade, Fifth Avenue, Pittsburgh, Pa., U.S.A. (Assignees of F. W. Sperr, Pittsburgh, Pa., U.S.A.) International Convention date, May 10, 1918.

Ammonium sulphate crystals in the centrifugal drier are neutralised by ammonia obtained from the "fixed" still, and which is free from sulphur, cyanides and phenol.

156,187. MERCURY, RECOVERING. Chemische Fabriken Worms, Akt.-Ges., 28, Mainzerlandstrasse, Frankfurt-on-Main, Germany. International Convention date, January 24, 1919.

Spent catalytic material containing mercury is heated to 200°-300°C. with iron powder to recover the mercury.

156,213. METALLIC SALTS. Chemische Fabriken Worms Akt.-Ges., 28, Mainzerlandstrasse, Frankfurt-on-Main, Germany. International Convention date, March 13, 1918.

Metallic salts such as mercury sulphate or phosphate, or ferric sulphate are obtained from the metal or lower oxide by effecting the usual reaction in the presence of small amounts of oxygen and an oxygen carrier, *e.g.*, oxygen and fuming nitric acid, or oxygen and nitric oxide. Impurities due to reduction by the metal are thus avoided.

156,215. ANTHRAQUINONE. Chemische Fabriken Worms Akt.-Ges., 28, Mainzerlandstrasse, Frankfurt-on-Main, Germany. International Convention date, May 18, 1918.

A hot mixture of anthracene with acetic acid and a small quantity of fuming sulphuric acid is treated with oxygen under pressure to produce anthraquinone. A small amount of nitrous gases may be added to the oxygen, and cobalt nitrate to the liquid mixture.

156,244-5. HYDROCARBONS, CATALYTIC OXIDATION OF. A. Wohl, 113, Hauptstrasse, Langfuhr, Dantzig, Germany. International Convention date, June 22, 1916, and December 18, 1916.

156,244. A mixture of hydrocarbon vapour and oxygen is passed over a catalyst such as vanadic or molybdic acid or salts of uranic or chromic acid heated to a temperature below red heat. Anthracene is thereby oxidised to anthraquinone, and aromatic hydrocarbons with side chains to aldehyde and acid.

156,245. In the above process, the catalyst may be salts of acids from elements capable of more than one degree of oxidation such as vanadates, chromates, molybdates, uranates, stannates or arsenates of copper, silver, lead, &c.

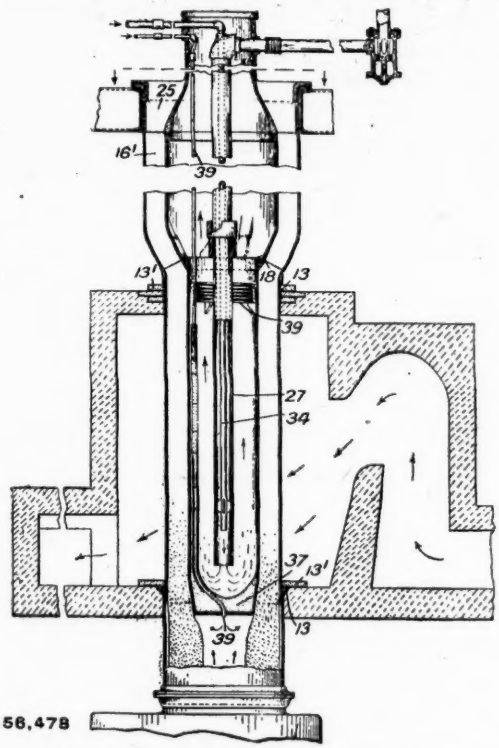
156,255. TAR OILS, RESINS, MINERAL OILS, &c., DISTILLING. Chemische Fabriken Worms Akt.-Ges., 28, Mainzerlandstrasse, Frankfurt-on-Main, Germany. International Convention date, January 23, 1917.

A higher yield of low boiling products is obtained by distilling tar oils, resins, or mineral oils in the presence of calcium chloride, caustic soda, aluminium chloride, sodium acetate, water glass, sulphuric acid, copper or aluminium powder, oxalic acid, kieselguhr, precipitated silica, or double salts.

156,478. NITROGEN, FURNACES FOR FIXATION OF. Nitrogen Products Co., 55, Canal Street, Providence, R.I., U.S.A. (Assignees of C. P. Hidden, Grosvenor Building, Providence, R.I., U.S.A.) International Convention date, January 27, 1919.

Briquettes of sodium carbonate, finely divided carbon, and

iron pass downwards through the annular retort illustrated, which is heated externally by furnace gases, and internally by a central burner to which gas and air are supplied by the



pipes 27, 34. Nitrogen is supplied through a pipe 39, which passes downwards through the heating chamber to heat the gas, and the nitrogen passes upwards through the charge.

LATEST NOTIFICATIONS.

159,847. Lubricating oil, purifying and reclaiming system. De Laval Separator Co. February 27, 1920.

159,852. Method of heat-treating alloys and operation heat-treating furnaces. Lavandeyra, A. de. March 3, 1920.

159,853. Process for the manufacture of a mixed nitro-phosphate manure. Soc. D'Etudes Chimiques Pour L'Industrie. March 2, 1920.

159,854. Process for the preparation of a nitrogen manure. Soc. D'Etudes Chimiques Pour L'Industrie. March 2, 1920.

159,866. Method of producing cyanamide from calcium cyanamide. Wargous Aktiebolag and Lidholm, J. H. March 3, 1920.

159,867. Bands of cellulosic material. Soc. Anon. La Cellophane. March 4, 1920.

159,869. Process for the production of hydrochloric acid by direct synthesis from its elements. Niccoli, E. March 2, 1920.

159,817. Process of producing ammonium chloride in coking or distilling coal in coking plants and gasworks. Christenson, O. L., and Hedman, B. A. March 3, 1920.

159,878. Process for the manufacture of ammonia. Norsk Hydro Elektrisk Kvaelstofaktieselskab. March 9, 1920.

159,837. Chlorotoluenes, Soc. Anon. Des Maturio Colorantes et Prodicts Chemiques De St. Denis. March 6, 1920.

159,838. Method of and apparatus for separating gluten from starch. Corn Products Refining Co. March 8, 1920.

159,880. Distillation processes. Chemical Fuel Company of America. March 9, 1920.

159,842. Manufacture of methyl alcohol from methyl chloride. Szarvasy, I. July 16, 1914.

159,845. Method and apparatus for measuring the density of gases. Konig, G. March 5, 1920.

Specifications Accepted, with Date of Application

2,690/1914. Roasting-furnaces. A Zavelberg. February 2, 1914.

134,815. Concentrated fatty emulsions, Method for cooling or for allowing to crystallize. K. Erslev. November 7, 1918.

136,158. Oxides of nitrogen, Production of—and a catalyzer therefor. General Chemical Co. September 7, 1918.

139,478. Material containing liquid, Process and apparatus for drying. G. Schjelderup. February 24, 1919.

140,069. Aluminium, Process for increasing the resistance of—to acid and alkaline liquids. Metallindustrie Schiele & Bruchsaler. March 8, 1919.

143,260. Dialkylsulphates, Process of manufacture of. L. Lilienfeld. December 15, 1913.

147,530. Metal oxides and other compounds of metals, Production of. New Jersey Zinc Co. July 12, 1919.

148,802. Separating solid substances from gases and vapours, more especially blast-furnace gases. Apparatus for, Deutsche Maschinenfabrik Akt.-Ges. December 2, 1918.

159,246. Bituminous coal, brown coal, and shale, Process and apparatus for distilling—by superheated steam. M. Gercke. October 20, 1919.

159,261. Purifiers, condensers and the like, Means for reversing the flow of gas in. Firth, Blakeley, Sons & Co., Ltd., and W. Blakeley. November 15, 1919.

159,285. Coal, Treatment of materials containing. E. Edser, H. L. Sulman, and F. B. Jones. November 20, 1919.

159,298. Furnaces. R. W. L. Phillips and J. R. Blaikie. November 21, 1919.

159,314. Mineral classifying and concentrating apparatus, Arrangement and construction of trommel for. W. W. Richardson. November 24, 1919.

159,337. Liquid sulphurous acid, Process and apparatus for the manufacture of—from dilute sulphurous acid gas. P. Pascal. December 2, 1919.

159,380. Magnetic or weakly-magnetic iron ore containing magnetic ferrous sulphide as a secondary constituent, process and apparatus for treating. R. Storen and R. Johanson. December 18, 1919.

Applications for Patents

Ampère Ges. Deigenthäler, O. and Rotha, F. Manufacture of molybdenum metal or its alloys. 7,906. March 12. (Germany, March 12, 1920.

Caspari, W. A. and Warburton, C. H. Manufacture of benzene mono-sulphonic acid. 7,830. March 12.

Chemical Fuel Co. of America. Distillation processes. 7,025. March 3. (United States, March 9, 1920).

" Processes of catalysis. 7,026. March 3. (United States, March 18, 1920).

Cross, W. (*Technochemia Akt.-Ges.*). Process for preliminary treatment of cellulose for manufacture of artificial silk. 7,135. March 4.

Desmond, S., and Tisdall, C. A. Fertiliser. 6,765. March 1.

Douglas & Sons, Ltd., W. Treatment of edible fats. 6,787. March 1.

Eustis, A. H. Recovering sulphur dioxide from furnace gases, &c 6,783, 6,784. March 1.

Hansford, J. B. Apparatus for drying sulphate of ammonia, &c. 6,686. March 1.

Harding, L. Admixture of liquid chemicals, &c. 6,721. March 1.

Goldschmidt, V. M. Manufacture of magnesium chloride. 7,597. March 9. (Norway, March 29, 1920.)

Günter, F. Oil and varnish colours soluble in water. 7,286. March 7.

Jackson, W. J. Mellersh-. (Bound Brook Oil-less Bearing Co.). Manufacture of self-lubricating bearings. 6,411. Feb. 25.

Kansas City Gasoline Co. Art of cracking hydrocarbons. 6,014. Feb. 22. (United States, March 12, 1920).

" Art of cracking hydrocarbons. 6,015. Feb. 22. (United States, April 23, 1920).

Kayser, E. C. Refining vegetable oils. 6,648. Febuary 28.

Kelly, A., and Walker, R. B. R. Manufacture of borax and boric acid. 7,045. March 3.

Kilburn, B. E. D. (*Titanium Pigment Co., Inc.*). Manufacture of composite titanic-oxide products. 6,618. February 28.

Lacamp, A. Apparatus for indicating temperature of liquids. 6,070. Feb. 23.

Liebreich, E. Process of electrolytically separating chromium. 7,425. March 8. (Germany, March 8, 1920.)

Little, Inc., A. D. Cellulose derivative, and process of preparing same. 7,569. March 9. (United States, April 10, 1920.)

" Process of preparing cellulose butyrate. 7570. March 9. (United States, July 26, 1920).

Lo Monaco, D. Chemical fertilisers. 6,434. Feb. 25. (Italy, Feb. 26, 1920).

Lunt, G. P. Method of drying colloids. 6,018. Feb. 22. (United States, April 7, 1916).

MacIlwaine, A. W. Extraction of oil by volatile solvents. 7,713. March 10.

Marks, E. C. R. (Stephens Engineering Co.) Processes of oxidizing fuel. 7,897. March 12.

Matthews & Yates, Ltd. Acetylene generators. 6,514. Feb. 26.

Neilson, A. Rotary pumps. 6,373. Feb. 25.

Nitrogen Corporation. Production of sodium bicarbonate. 7,408. March 8. (United States, March 11, 1920.)

Norsk Hydro Elektrisk Kvælstofaktieselskab. Manufacture of ammonia. 6,801. March 1. (Norway, March 9, 1920).

Pelman, J. Apparatus for indicating temperature of liquids. 6,070. Feb. 23.

Perkins, W. G. Treatment of oxidised ores. 5,899. Feb. 21.

Phillipson, G. A. and Thwaite, A. E. Sulphate of ammonia drier and neutralizer. 7,754. March 11.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co. and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

Market Report

THURSDAY, March 17.

The week has been one of considerable uncertainty as it has proved impracticable to fathom the effect of the impasse which has been reached in the negotiations with Germany regarding Reparations.

It is probable that in the course of days it may be known what will be the policy of Germany, and buyers will then have a better opportunity of forming an idea as to the effect of the situation upon the general standard of values.

At the moment it would appear that the effect will be to increase the cost of Chemicals generally, which must be imported not only from Germany, but from other foreign countries.

The export market is paralysed for much the same reason as in the case of this country.

General Chemicals

ACETONE remains a very slow market, but stocks are in firm hands and the price is fully maintained.

ACID ACETIC is in steady demand for prompt delivery, and it is generally thought that stocks have been very materially reduced. The price is unchanged, but the undertone is firm.

ACID BORIC remains in good enquiry.

ACID CITRIC.—The market seems to have a healthier tendency and higher prices are not improbable with the advent of the season.

ACID FORMIC has become largely a nominal market owing to the political situation.

ACID OXALIC.—The price is much higher and the small stocks available on this side are in many cases held, awaiting developments.

ACID TARTARIC is still a weak market in spite of the fact that an increase in demand is usually experienced at this time. Only a nominal business is reported.

BLEACHING POWDER is nominally unchanged, but this article is also likely to be affected by the Continental situation.

SULPHATE OF COPPER is in a hopeless position and it is difficult to see whence relief can come, having regard to the present state of the Southern exchanges.

FORMALDEHYDE is in fair demand. Price unchanged.

LEAD ACETATE.—The demand is exceedingly unsatisfactory and the article continues to favour buyers.

POTASH PRUSSIATE is in very short supply and much firmer in price.

SALAMMONIAC.—The further reduction in price which was recently indicated by British manufacturers fails to stimulate the demand. Trade is stagnant.

SODA ACETATE is one of the few bright spots, although unfortunately most of the business is in realisation stocks, which leaves holders with a heavy loss.

SODA BICHROMATE.—It is understood that the English makers are contemplating a reduction in price. At the moment the market is entirely controlled by re-sale parcels.

SODA CAUSTIC remains a drag on the market and the situation is distinctly absorbing.

SODA HYPOSULPHITE.—The firmer tendency is maintained, and if German supplies are no longer forthcoming, a higher price is to be expected.

SODA NITRITE.—The improved demand is maintained, and although the turnover is comparatively small, the general position is decidedly healthier.

SODA PRUSSIATE is unchanged and almost a nominal market.

ZINC SULPHATE.—Although the enquiry has been better, it is difficult to detect any substantial volume of business.

Coal Tar Intermediates

This market still continues quiet and little business is reported. Prices are purely nominal.

ALPHA NAPHTHOL.—A fair inquiry has been received on export account, but no actual business is reported.

BETA NAPHTHOL.—Only a moderate inquiry is being received and it is expected that when the stocks in second hands are cleared the price will be slightly higher.

PARANITRANILINE is easier and only in very light demand.

SALICYLIC ACID is in better request and the price of the B.P. quality is slightly firmer.

Coal Tar Products

The market for coal tar products shows no improvement.

90's BENZOL.—The output of this article is still somewhat restricted. At the same time the demand is only very moderate. Prices remain at 2s. 8d. to 2s. 10d. on rails in the north, and 2s. 9d. to 2s. 11d. in the south.

PURE BENZOL can be bought at 2s. 10d. to 3s. on rails.

CREOSOTE OIL is weak at 9½d. to 10d. per gallon in the North and 10d. to 10½d. in the South.

CRESYLIC ACID is inactive, and quoted at 2s. 6d. to 2s. 9d. for the Pale 97-99 per cent. quality, and 2s. 3d. to 2s. 6d. for Dark 95-97 per cent.

SOLVENT NAPHTHA can be bought at 2s. on rails.

HEAVY NAPHTHA is also in poor demand and is quoted at 2s. 2d.

NAPHTHALENE is very easy and is quoted at from £8 to £14 per ton for Crude, and £24 to £27 per ton for Refined.

PITCH.—There is no change in the position.

Sulphate of Ammonia

There is nothing to report.

Current Prices

Chemicals

	per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	2	6	to	0	2	9
Acetone oil	ton	90	0	0	to	95	0	0
Acetone, pure	ton	95	0	0	to	100	0	0
Acid, Acetic, glacial, 99-100%	ton	70	0	0	to	72	0	0
Acetic, 80% pure	ton	53	0	0	to	54	0	0
Arsenic	ton	100	0	0	to	105	0	0
Boric, cryst.	ton	69	0	0	to	70	0	0
Carbolic, cryst. 39-40%	lb.	0	0	9	to	0	0	9½
Citric	lb.	0	2	7	to	0	2	8
Formic, 80%	ton	80	0	0	to	85	0	0
Gallic, pure	lb.	0	4	9	to	0	5	0
Hydrofluoric	lb.	0	0	8½	to	0	0	9
Lactic, 50 vol.	ton	37	10	0	to	40	0	0
Lactic, 60 vol.	ton	42	10	0	to	45	0	0
Nitric, 80 Tw.	ton	41	0	0	to	44	0	0
Oxalic	lb.	0	0	10	to	0	0	11
Phosphoric, 1.5	ton	55	0	0	to	57	0	0
Pyrogallic, cryst	lb.	0	9	6	to	0	9	9
Salicylic, Technical	lb.	0	1	2	to	0	1	4
Salicylic, B.P.	lb.	0	1	6	to	0	1	8
Sulphuric, 92-93%	ton	8	10	0	to	8	15	0
Tannic, commercial	lb.	0	3	6	to	0	3	9
Tartaric	lb.	0	1	9	to	0	1	10
Alum, lump	ton	18	0	0	to	18	10	0
Alum, chrome	ton	45	0	0	to	50	0	0

	per	£	s.	d.		£	s.	d.
Alumino ferric	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15%	ton	13	0	0	to	14	0	0
Aluminium, sulphate, 17-18%	ton	15	5	0	to	16	0	0
Ammonia, anhydrous	lb.	0	2	2	to	0	2	4
Ammonia, .880	ton	43	0	0	to	45	0	0
Ammonia, .920	ton	30	0	0	to	32	10	0
Ammonia, carbonate	lb.	0	0	4	to		—	
Ammonia, chloride	ton	65	0	0	to	70	0	0
Ammonia, muriate (galvanisers)	ton	55	0	0	to	57	0	0
Ammonia, nitrate	ton	55	0	0	to	60	0	0
Ammonia, phosphate	ton	95	0	0	to	100	0	0
Ammonia, sulphocyanide	lb.	0	3	0	to	0	3	3
Amyl acetate	ton	420	0	0	to	425	0	0
Arsenic, white, powdered	ton	55	0	0	to	60	0	0
Barium, carbonate, 92-94%	ton	12	10	0	to	13	0	0
Barium, chlorate	lb.	0	0	11	to	0	1	0
Chloride	ton	20	0	0	to	21	0	0
Nitrate	ton	55	0	0	to	56	0	0
Barium Sulphate, blanc fixe, dry	ton	30	0	0	to	31	0	8
Sulphate, blanc fixe, pulp	ton	16	10	0	to	17	0	0
Sulphocyanide, 95%	lb.	0	1	6	to	0	1	0
Bleaching powder, 35-37%	ton	20	0	0	to	21	0	0
Borax crystals	ton	34	0	0	to	36	0	0
Calcium acetate, Brown	ton	15	0	0	to	17	0	0
,, Grey	ton	23	0	0	to	25	0	0
Calcium Carbide	ton	29	0	0	to	30	0	0
Chloride	ton	12	10	0	to	13	0	0
Carbon bisulphide	ton	65	0	0	to	67	0	0
Casein, technical	ton	90	0	0	to	92	0	0
Cerium oxalate	lb.	0	3	9	to	0	4	0
Chromium acetate	lb.	0	1	2	to	0	1	4
Cobalt acetate	lb.	0	11	6	to	0	12	6
Oxide, black	lb.	0	16	0	to		—	
Copper chloride	lb.	0	1	3	to	0	1	6
Sulphate	ton	39	0	0	to	40	0	0
Cream Tartar, 98-100%	ton	140	0	0	to	150	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde 40% vol	ton	120	0	0	to	122	10	0
Formusol (Rongalite)	lb.	0	4	9	to	0	5	1
Glauber salts, commercial	ton	6	0	0	to	7	0	0
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols.	gal.	0	2	8	to	0	2	9
Iron perchloride	ton	50	0	0	to	52	0	0
Iron sulphate (Copperas)	ton	4	0	0	to	4	5	0
Lead acetate, white	ton	50	0	0	to	52	0	0
Carbonate (White Lead)	ton	43	0	0	to	46	0	0
Nitrate	ton	55	0	0	to	57	0	0
Litharge	ton	38	10	0	to	40	0	0
Lithopone, 30%	ton	30	0	0	to	32	10	0
Magnesium chloride	ton	15	10	0	to	16	10	0
Carbonate, light	cwt.	2	15	0	to	3	0	0
Sulphate (Epsom salts commercial)	ton	12	10	0	to	13	0	0
Sulphate (Druggists')	ton	18	10	0	to	19	10	0
Manganese, Borate	ton	70	0	0	to	75	0	0
Sulphate	ton	75	0	0	to	78	0	0
Methyl acetone	ton	95	0	0	to	100	0	0
Alcohol, 1% acetone	ton	145	0	0	to	150	0	0
Nickel sulphate, single salt	ton	60	0	0	to	62	0	0
Nickel ammonium sulphate, double salt	ton	62	0	0	to	64	0	0
Potash, Caustic	ton	48	0	0	to	50	0	0
Potassium bichromate	lb.	0	1	1	to		—	
Carbonate, 90%	ton	85	0	0	to	90	0	0
Chloride	ton	50	0	0	to	52	0	0
Chlorate	lb.	0	0	8½	to	0	0	9
Meta bisulphite, 50-52%	ton	290	0	0	to	205	0	0
Nitrate, refined	ton	58	0	0	to	60	0	0
Permanganate	lb.	0	2	6	to	0	2	9
Prussiate, red	lb.	0	2	6	to	0	2	9
Prussiate, yellow	lb.	0	1	6	to	0	1	7
Sulphate, 90%	ton	31	0	0	to	33	0	0
Salammoniac, firsts	cwt.	3	15	0	to		—	
Seconds	cwt.	3	10	0	to		—	
Sodium acetate	ton	35	0	0	to	37	10	0
Arsenate, 45%	ton	60	0	0	to	62	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	8	to	0	0	8½
Bisulphite, 60-62%	ton	37	10	0	to	40	0	0
Chlorate	lb.	0	0	5½	to	0	0	5½
Caustic, 70%	ton	24	0	0	to	24	10	0
Caustic, 76%	ton	25	0	0	to	25	10	0
Hydrosulphite, powder, 85%	lb.	0	2	3	to	0	2	6
Hyposulphite, commercial	ton	26	0	0	to	27	0	0
Nitrite, 96-98%	ton	50	0	0	to	52	0	0
Phosphate, crystal	ton	30	0	0	to	32	0	0
Perborate	lb.	0	1	9	to	0	2	0
Prussiate	lb.	0	0	8½	to	0	0	9
Sodium Sulphide, crystals	ton	20	0	0	to	23	0	0
Sulphide, solid, 60-62%	ton	40	0	0	to	41	0	0
Sulphite, cryst	ton	15	0	0	to	16	0	0
Strontium carbonate	ton	85	0	0	to	90	0	0
Strontium Nitrate	ton	90	0	0	to	95	0	0
Strontium Sulphate, white	ton	8	10	0	to	10	0	0
Sulphur chloride	ton	42	0	0	to	44	10	0
Sulphur, Flowers	ton	19	0	0	to	19	10	0
Roll	ton	19	0	0	to	19	10	0
Tartar emetic	lb.	0	2	3	to	0	2	6
Tin perchloride, 33%	lb.	0	2	6	to	0	2	7
Perchloride, solid	lb.	0	3	0	to	0	3	3
Protochloride (tin crystals)	lb.	0	2	0	to	0	2	1
Zinc chloride, 102 Tw.	ton	22	0	0	to	23	10	0
Chloride, solid, 96-98%	ton	60	0	0	to	65	0	0
Oxide, 99%	ton	45	0	0	to	47	10	0
Dust, 90%	ton	90	0	0	to	92	10	0
Sulphate	ton	21	10	0	to	23	10	0

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	4	0	to	0	4	3
Alphanaphthol, refined	lb.	0	4	6	to	0	4	9
Alphanaphthylamine	lb.	0	3	3	to	0	3	6
Aniline oil, drums extra	lb.	0	1	8	to	0	1	9
Aniline salts	lb.	0	1	10	to	0	2	0
Anthracene, 85-90%	lb.		—		to		—	
Benzaldehyde (free of chlorine)	lb.	0	5	3	to	0	5	6
Benzidine, base	lb.	0	11	6	to	0	12	0
Benzidine, sulphate	lb.	0	10	0	to	0	10	6
Benzoic acid	lb.	0	2	3	to	0	2	6
Benzoate of soda	lb.	0	2	3	to	0	2	6
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	0	9	6	to	0	10	0
Betanaphthol	lb.	0	3	0	to	0	3	3
Betanaphthylamine, technical	lb.	0	11	6	to	0	12	6
Croceine Acid, 100% basis	lb	0	5	0	to	0	6	3
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	6	9	to	0	7	6
Dinitrobenzol	lb.	0	1	5	to	0	1	6
Dinitrochlorbenzol	lb.	0	1	5	to	0	1	6
Dinitronaphthaline	lb.	0	1	6	to	0	1	8
Dinitrotoluol	lb.	0	1	8	to	0	1	9
Dinitrophenol	lb.	0	3	0	to	0	3	3
Dimethylaniline	lb.	0	5	9	to	0	6	0
Diphenylamine	lb.	0	5	0	to	0	5	3
H-Acid	lb.	0	10	0	to	0	10	6
Metaphenylenediamine	lb.	0	5	9	to	0	6	0
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	7	6	to	0	8	6
Monosulphonic Acid (2:7)	lb.	0	7	6	to	0	8	0
Naphthionic acid, crude	lb.	0	4	0	to	0	4	3
Naphthionate of Soda	lb.	0	4	3	to	0	4	6
Naphthylamin-di-sulphonic-acid	lb.	0	5	0	to	0	5	6
Nitronaphthalene	lb.	0	1	6	to	0	1	8
Nitrotoluol	lb.	0	1	4	to	0	1	5
Orthoamidophenol, base	lb.	0	18	0	to	1	0	0
Orthodichlorbenzol	lb.	0	1	1	to	0	1	2
Orthotoluidine	lb.	0	2	3	to	0	2	6
Orthonitrotoluol	lb.	0	1	3	to	0	1	4
Para-amidophenol, base	lb.	0	12	6	to	0	13	0
Para-amidophenol, hydrochlor	lb	0	13	0	to	0	13	6
Paradichlorbenzol	lb.	0	0	7	to	0	0	8
Paranitraniline	lb.	0	6	0	to	0	6	6
Paranitrophenol	lb.	0	2	9	to	0	3	0
Paranitrotoluol	lb.	0	5	9	to	0	6	0
Paraphenylenediamine, distilled	lb.	0	13	6	to	0	14	6
Paratoluidine	lb.	0	8	3	to	0	8	6
Phthalic anhydride	lb.	0	4	9	to	0	5	0
Resorcin, technical	lb.	0	7	6	to	0	8	6
Resorcin, pure	lb.	0	9	3	to	0	9	9
Salol	lb.	0	4	0	to	0	4	3
Sulphanilic acid, crude	lb.	0	1	8	to	0	1	9
Tolidine, base	lb.	0	8	6	to	0	10	0
Tolidine, mixture	lb.	0	2	9	to	0	3	0

Cardiff By-Products

CARDIFF, WEDNESDAY.

Sulphate of Ammonia—	
For home consumption (per ton o.t.)	£24 11s.
For export (per ton o.t.)	£20 to £30
National Benzole (per gallon)	3s. to 3s. 6d.
Solvent Naphtha (per gallon)	2s. 6d. to 2s. 8d.
Heavy Naphtha (per gallon)	2s. 10d. to 3s.
Crude Naphthalene Salts (per ton)	£9 to £15
Pitch (per ton)	100s. to 120s.
Creosote (per gallon)	11d. to 1s.
Crude Benzol (per gallon)	1s.9d. to 2s.
Toluol (per gallon)	4s.

Company News

CALIFORNIA PETROLEUM.—Regular quarterly dividend of 1¾ per cent., actual on preference stock, payable April 1.

MUNTZ'S METAL.—Dividends at the rate of 5 per cent. on preference and 15 per cent. on ordinary shares (both less tax) for five months to December 31 last.

REMBIA RUBBER ESTATES.—The net profit of the Rembia Rubber Estates for the year ended September 30 was £251, while £10,344 was brought forward and £2,492 was received as refund of income tax, making a total of £13,087, which is carried forward.

LEVER BROTHERS.—A meeting of shareholders on Tuesday agreed to an issue of £15,000,000 of debenture stock, of which £4,000,000 is to be placed on the market forthwith. The prospectus announcing the issue of £4,000,000 7 per cent. first mortgage debenture stock 1931-1941, at 92½ per cent., was issued on Thursday and the subscription list will close on or before Thursday next.

ELECTRO BLEACH & BY-PRODUCTS.—Profit for year 1920, after deducting depreciation, income tax, debenture interest, bonus to employees, and making a reserve for excess profits duty and corporation profits tax, £51,644. and £4,277 was brought in, making £55,921. Further dividend of 9 per cent. on preference shares, making 12½ per cent. for the year, and dividend of 25 per cent. on ordinary; forward, £5,921. Meeting Midland Hotel, Manchester, March 23, at 11.

ANGLO-PERSIAN OIL.—As foreshadowed in THE CHEMICAL AGE (*see* page 290, March 5), the subscription list of the new issue opened on March 11. The present issue is of 3,500,000 9 per cent. cumulative preference shares of £1 each at par, payable 2s. 6d. on application, 2s. 6d. on allotment and three instalments of 5s. payable on April 12, May 10 and June 7. The subscription list was closed on Wednesday. It is understood that the issue was largely over-subscribed.

LIMMER & TRINIDAD LAKE ASPHALT.—The accounts for 1920 show a profit of £86,894 exclusive of £13,470 brought forward. Final dividend of 7½ per cent. and bonus of 6d. per share on both old preference and old ordinary, and dividend at same rate and bonus of 2½d. per share for five months from August 1, 1920, on the shares issued last May. Sum of £4,000 is added to general reserve and £16,594 carried forward (subject to final adjustment of excess-profits duty and corporation-profits tax).

SOUTHALL BROTHERS & BARCLAY.—The report states that after providing for bad debts, depreciation, Corporation Tax, Excess Profits Duty, income tax, &c., there is a a balance of profit for the year of £25,310, which with the amount of £16,933 carried forward makes a total of £42,244. A 10 per cent. dividend on the ordinary shares, free of tax, is recommended, together with a bonus of 6d. per share on the ordinary shares, free of income tax, and £12,000 to be written off goodwill and patents, and £3,000 placed to reserve.

BENN BROTHERS, LTD.—A petition was presented to the High Court of Justice by Benn Brothers, Ltd., on February 16, for confirming the alteration of the objects of the company and for reorganisation of its share capital. This petition was sanctioned by the judge on March 15. The share capital as re-organised consists of 150,000 ordinary shares of £1 each. This is effected by cancelling the 3,000 preference shares of £1 each in the capital of the company and consolidating such 3,000 preference shares and the 147,000 ordinary shares of £1 each in the company's capital into a single class of 150,000 ordinary shares, all ranking *pari passu* in all respects.

BORAX CONSOLIDATED.—The profits for the year ended September 30, after making provision for excess profits duty and corporation tax, were £476,581 (against £442,023 in the previous year). The sum of £50,000 (against £40,000) is placed to reserve for depreciation of plant, &c., £5,825 (the same) to debenture stock redemption sinking fund, while £4,237 (against £2,871) is placed to investment reserve. £25,000 (the same) is placed to general reserve; £30,000 (against £20,000) is placed to income-tax reserve, and £5,000 (the same) is allocated for pensions and grants fund, leaving £119,639 to be carried forward (against £103,348) carried forward in the previous year. Meeting, 16, Eastcheap, E.C., April 5, noon.

UNITED CHEMICAL CORPORATION.—Speaking on Tuesday at the first annual general meeting of the United Chemical Corporation, Ltd., the chairman (Mr. Herbert Bent) said the directors regretted they had not a more favourable report to submit. The difficulties existing in normal times in introducing into the market, in face of established rivals, articles such as theirs were very great, and had been increased by the general trade depression. A large amount of preparatory work had been necessary, and as a result their sales were satisfactorily improving. That their goods had a future before them was proved by reports received. There was every reason to hope that with the reversion of trade to normal conditions they might look forward to a satisfactory expansion of business in the current year.

ANGLO-SPANISH TARTAR REFINERIES.—Particulars have been published, for public information only, of the Anglo-Spanish Tartar Refineries, Ltd., no subscription for shares being invited. The company, which has an authorised share capital of £150,000, divided into 140,000 £1 ordinary shares, and 200,000 deferred shares of 1s. each, was formed in May last to carry on the business of manufacturing chemists, &c., and to acquire from the Sociedad Anonima Monegal of Barcelona a factory with plant for the manufacture of cream of tartar. The Anglo-Spanish Tartar Refineries subsequently incorporated the Astref Refineries de Tartaros S.A. to acquire and operate the above factory, together with another factory, for the production of cream of tartar and tartaric acid. Of the capital stated above, 107,500 ordinary and 200,000 deferred shares have been issued.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIALS.	REF. NO.
Montreal ...	Iron and steel specialities ...	302
Cape Town	China	304
Brussels ...	Metals; rubber	309
Lima	Aluminium	326
Trieste ...	Oils; fats	—
Milan ...	Rubber goods; crude leather ...	—
Milan ...	Rubber articles and vulcanising plant	—
Warsaw ...	Chemicals, raw materials for the tanning industry	—

Tariff Changes

AUSTRALIA.—Under the British Preferential Tariff glycerine crude and refined may be admitted free of duty.

MALAY STATES (KEDAH).—An *ad valorem* export duty of 10 per cent. has been imposed upon wood oil.

SOUTH AFRICA.—The Commissioners of Customs has approved of the following standard for asphalt, bitumen, pitch and heavy oil, and preparations thereof for road or pavement construction, imported in bulk under item 76 (*a*) of the Customs Tariff: (*a*) Asphalt, bitumen and pitch and preparations thereof, must contain less than 60 per cent. of mineral matter; (*b*) heavy oils must be of such a nature that on heating at 160°C. for six hours they do not lose more than 10 per cent. of their weight. Goods of this standard are subject to a duty of 3 per cent. *ad valorem*, with a rebate of the whole duty when the produce or manufacture of the United Kingdom and reciprocating British Colonies.

NETHERLANDS.—The prohibition of the exportation of toluol has been removed.

PERU.—The export duty on vanadium ores and concentrates is fixed at the rate of £p.4.529 per metric ton, irrespective of the vanadic acid contents or their price. This duty is to remain in force until the end of 1921.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Bankruptcy Information

SLADE, J., 9, Corporation Street, Stalybridge, Chester, and WALKER, J. A. R., 31, Crofts Bank Road, Urmston, Lancaster, carrying on business under the style of The Hopex Drug Co., 9, Corporation Street, Stalybridge. Date of Receiving Order, March 7, 1921.

Partnership Dissolved

HOLMES, H. D., WADDINGTON, A., and SUTCLIFFE, W. H. F., carrying on business as manufacturing chemists and edible-oil and compound merchants, at Gills Court, Crown Street, Halifax, under the style of A. WADDINGTON & CO., by mutual consent as and from February 28, 1921. All debts received and paid by H. D. Holmes and A. Waddington, who will in future carry on the business.

Company Winding Up

ANILINE DYE & CHEMICAL CO., LTD.—The petition will be heard before the Court sitting at the Assize Courts, Manchester, on March 21, 1921, at 10.45 a.m. H. Winstanley, Registrar. Tatham, Worthington & Co., 1, St. James Square, Manchester, solicitors to the petitioners.

NOTE.—Any person who intends to appear on the hearing of the petition must notify the above named not later than 2 p.m. on March 19, 1921.

Companies Winding Up Voluntarily

COAL BY-PRODUCTS (PARENT) SYNDICATE, LTD.—Creditors' claims on or before March 31, to the Liquidator A. W. Bellman, 6, Martineau Road, Highbury Hill, London, N.5.

FLUORUNDUM FLAME CARBONS, LTD. (in voluntary liquidation).—A meeting of creditors will be held at 4, Pavilion Buildings, Brighton, on Tuesday, March 22, at 11 a.m. F. N. Clarke, Liquidator.

FRENCH SHALE SYNDICATE, LTD. (in voluntary liquidation).—A meeting of creditors will be held on Wednesday, March 23, at 12 noon, at the registered offices of the company, 65, Bishopsgate, London, E.C. Creditors' claims on or before April 30, to the Liquidator, A. R. Bennett, at the above address.

INDO BURMA OILFIELDS, LTD. (in voluntary liquidation).—A general meeting of members will be held at 69, Broad Street Avenue, London, E.C., on Friday, April 15, at 12.15 p.m. A. A. Hall, Liquidator.

KEELING'S OXIDES, LTD.—Mr. F. W. Carder, of Stoke-upon-Trent, Liquidator.

MENNO LUBRICATOR CO., LTD., (in voluntary liquidation).—Mr. M. G. Chant, Bassishaw House, 70A, Basinghall Street, London, E.C., Liquidator.

METHYLATORS, LTD. (in voluntary liquidation).—A general meeting of members will be held at the offices of the Liquidator, 13, Harrington Street, Liverpool, on April 12, at 11 a.m. J. H. Welch, Liquidator.

THE ANGLO-CHEMICAL & COLOUR CO., LTD.—Mr. A. Whale, 7, Union Court, Old Broad Street, London, E.C.2, Liquidator.

Liquidator's Notice

SELLY CHEMICAL CO., LTD.—Creditors claims on or before May 11, to the Liquidator, Mr. W. Smailes, Ocean Chambers, Lowgate, Kingston-upon-Hull.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, created after July 1, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.]*

ALLUTA RUBBER & PRODUCE CO., LTD., London, E.C.—Registered March 4, £8,750 debentures (filed under sec. 93 (3) of the Companies (Consolidation) Act, 1908), present issue £5,000; general charge. *——. August 18, 1920.

FLEXIBLE METAL CO., LTD., London, N.—Registered March 2, £5,000 (not ex.) charge, to London Joint City & Midland Bank, Ltd.; charged on 796, Holloway Road, N. *Nil. January 14, 1921.

FLINT GAS & WATER CO., LTD.—Registered February 23, £1,000 mortgage to London Joint City & Midland Bank, Ltd.; general charge. *£2,000. March 29, 1919.

LEWA RUBBER ESTATES LTD., London, E.C.—Registered February 28, £1,000 (not ex.) mortgage to Lloyds Bank Ltd.; charged on uncalled capital amounting to 3s. per share on 155,400 of the 219,400 issued shares of the Company, or £23,310 in all. *——. January 3, 1921.

NORTH BRITISH MANURE CO., LTD., Liverpool.—Registered March 1, debenture securing all moneys due or to become due, to Manchester & Liverpool District Banking Co., Ltd.; general charge. *£10,000. February 24, 1920.

Satisfaction

ECLIPSE GLASS WORKS LTD., London, E.—Satisfaction registered March 2, £800, registered February 27, 1912.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

RYMER, H. W., Hertford Road, Barking, chemist. £518 11s. January 26.

BROOKS, T. H., 128, Nightingale Road, Hitchin, chemist. £13 19s. 2d. January 29.

MAITLAND, A. A., 16, Waverley House, Kenton Street, London, W.C., chemist. £14 18s. 2d. February 1.

PLUMBEX, LTD., Yiewsley, chemical plant makers. £10 16s. 2d. February 2.

BARHAM, J., 72, Emanuel Road, Balham, chemist. £13 19s. 10d. December 18.

Polish Chemical Developments

THE chemical industry in that part of Poland, which was known before the war as Prussian Poland, shows signs of a sound and remarkable development, and its productivity has been recently extended to the field of chemical by-products of alcohol. The distilleries of Posen and Pomerania have been amalgamated under the style of "Akwawit Rectification of Alcohol and Chemical Factory," the offices of the company being in Poznan (Posen).

The company has acquired all the distilleries situated in Poland, belonging to the firms: C. A. F. Kahlbaum, of Berlin, and the Breslauer Distillery of the Charlottenburgh Company. The subscribed capital of the "Akwawit" company amounts to 20 million marks, and the chief subscribers are: The Land Bank of Posen (2,500,000 marks), the Kwilecki Potocki & Co. Bank (2,500,000 marks). The Co-operative Union Bank (1,000,000 marks), the Commercial Bank of Posen (11,700,000 marks), C. A. F. Kahlbaum (2,000,000 marks).

Government Contracts

THE following Government contracts were let during January :—

ADMIRALTY.—*Carbon Rods*: Morgan Crucible Co., Ltd., London, S.W. *Sheets and Slabs, Zinc*: W. Barns & Son, London; Locke, Lancaster & W. W. & R. Johnson & Sons, Ltd., London, E.C. *Explosives*: The Explosives & Chemical Products, Ltd., London, E.C.

WAR OFFICE.—*Bleaching Powder*: United Alkali Co., Ltd., Liverpool. *Methylated Spirit*: Sutton, Cardon & Co., Ltd., London.

AIR MINISTRY.—*Fuel Oil*: Anglo-American Oil Co., Ltd., London, E.C. *Laboratory Furniture*: Bennet Furnishing Co., Ltd., London, S.E.

POST OFFICE.—*Liquid Air Plant*: British Oxygen Co., Ltd., London, S.W.

HIGH COMMISSIONER FOR INDIA.—*Acids*: Howards & Sons, Ltd., Ilford. *Silver Nitrate*: Johnson, Matthey & Co., London, E.C.

CROWN AGENTS FOR THE COLONIES.—*Detonators*: Nobel Industries, Ltd., London, W. *Drugs*: Burgoyne, Burbidges & Co., East Ham. *Explosives*: Nobels Explosives, Ltd., Glasgow.

Crude Oils of Borneo

ON Tuesday evening, at a meeting of the Institution of Petroleum Technologists, Mr. James Kewley, F.I.C., submitted a paper on "The Crude Oils of Borneo."

The paper gave a brief outline of the chemistry of the crude petroleums found in Borneo together with an account of their geology, in order to suggest a possible relation between the chemical characters of the oils and their mode of accumulation. A brief outline of the method of working up these crudes into commercial products was given, indicating how these methods have been modified to meet present-day conditions and demands.

New Companies Registered

The following have been prepared for us by Jordan & Sons, Ltd., company registration agents, 116 and 117, Chancery Lane, London, W.C.2 :—

BAILES (ARTHUR T.), LTD., 1252, Leeds Road, Bradford. Chemists, druggists and drysalters. Nominal capital, £2,000 in 1,000 preference shares and 1,000 ordinary shares of £1 each. Directors: A. T. Bailes, Elizabeth M. Bailes. Qualification of directors, £100.

DELTA OIL & REFINING CO. (Incorporated in the State of Delaware, U.S.A.) Manufacturers of petroleum and oil into their products and by-products. Nominal capital, 5,000,000 dollars in 500,000 shares of 10 dollars each. Names of persons authorised to accept service: C. E. Bayford, J. Gill. (Managing director, James Gill, Ltd., London agents.)

FEDERATION OF HIDE GELATINE & GLUE MANUFACTURERS, LTD., 10, Gray's Inn Place, Gray's Inn, W.C. Every member to contribute a sum not exceeding £5 if necessary. Directors: H. B. Cox, (chairman), T. Oldroyd (vice-chairman), E. Ball (vice-chairman), L. J. Henry.

MAPPIN RUBBER CO., LTD. India-rubber manufacturers. Nominal capital, £1,000 in 1,000 ordinary shares of £1 each. Directors: C. H. Holgate, Lilian Holgate. Qualification of directors, £200.

SCOTT, J. FRED., & CO., LTD.—Manufacturers of paper, paper pulp, &c. Nominal capital, £2,000 in 2,000 shares of £1 each. Directors: J. F. Scott, H. C. Wilson, T. P. Holmes. Qualification of directors, £100. Remuneration of directors, £25 each; chairman, £30.

W. G. STUCKEY & CO., LTD., 70, Tottenham Court Road, W. 1. Chemist and druggist. Nominal capital, £10,000 in 10,000 shares of £1 each. Directors: to be appointed by subscribers. Qualification of directors, £100. Remuneration of directors, £100 each.

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